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New-World Health Series

NEW PRIMER OF HYGIENE

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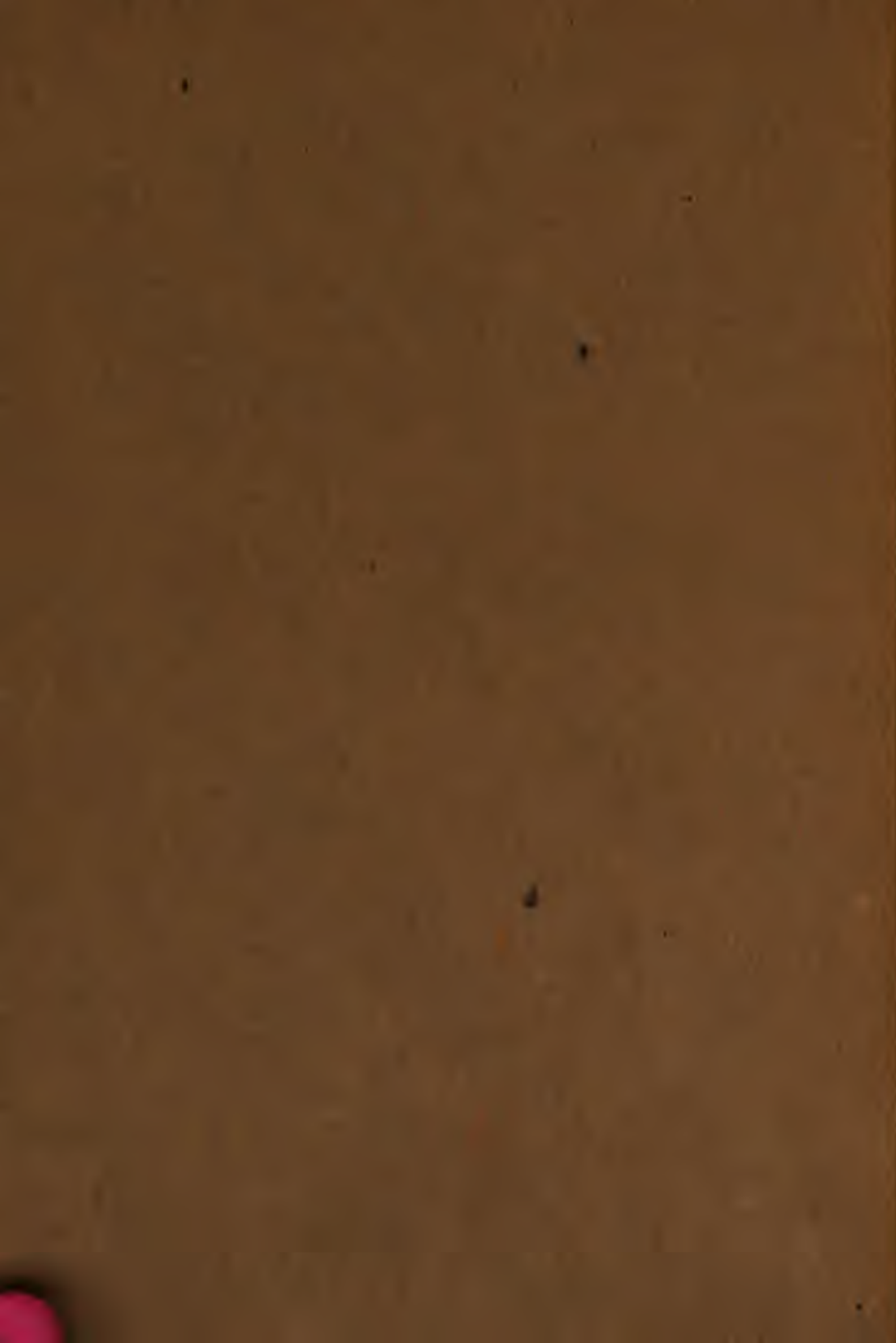
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New-World Health Series

BOOK I

* * *

NEW PRIMER OF HYGIENE

A SIMPLE TEXTBOOK
ON PERSONAL HEALTH AND
HOW TO KEEP IT

By John W. Ritchie

Professor of Biology
College of William and Mary

and Joseph S. Caldwell

Plant Physiologist
Bureau of Plant Industry
United States Department
of Agriculture

ILLUSTRATED



Yonkers-on-Hudson, New York
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1919

WORLD BOOK COMPANY

THE HOUSE OF APPLIED KNOWLEDGE

Established, 1905, by Caspar W. Hodgson

YONKERS-ON-HUDSON, NEW YORK
2126 PRAIRIE AVENUE, CHICAGO

"Our national health is physically our greatest asset. To prevent any possible deterioration of the American stock should be a national ambition." These words of Theodore Roosevelt express the idea that has actuated authors and publisher of New-World Health Series. The texts explain the means by which young Americans can lay the foundations for sane and vigorous lives. They stand preëminent among Books That Apply the World's Knowledge to the World's Needs. This particular volume, which comes first in the series, teaches the lower-grade pupil what he himself can do to keep his body in health—personal hygiene. The conservation of individual and national health is the purpose of the series



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MARCH 17, 1927

PREFACE

THE writers of this text have felt that the greatest immediate service our schools can render is to teach the facts that will enable the people to shake off the great burden of preventable disease that they are now carrying. They believe that hygiene should be faithfully taught in every schoolroom in the land, and that the object of teaching it should be the prevention of sickness. The single purpose of the authors has been to select the facts that have been shown by modern science to be vital in health conservation, and to present these facts in the simplest form possible.

New Primer of Hygiene represents a careful and conservative revision of the latest edition of *Primer of Hygiene*. Matter dealing with established truths has been left practically unchanged. Statements of fact in their nature timely have been made to accord with latest developments. Where knowledge of an important subject — as food needs of the body — has increased, additional matter has been presented. The text has been largely re-illustrated. In the selection of pictures the governing considerations were substantially those that controlled in the revision of the text. For the use of the photograph of the ancient statue of Hygeia, goddess of health, which appears on the opposite page, acknowledgments are due the Metropolitan Museum of Art, New York City.

It is hoped that this little book may serve a useful purpose in the hands of those earnest teachers who are leading their pupils and their communities into the era of good health that lies before us.

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NEW PRIMER OF HYGIENE

CHAPTER ONE

THE IMPORTANCE OF KEEPING THE BODY IN HEALTH



FIG. 1. When we have health we find the world a beautiful place in which to live.

ALL of us know that this is a beautiful and a pleasant world. We enjoy the songs of the birds and the beauty of the flowers. It gives us pleasure to feel the soft winds of spring and to watch the green come back on the trees. We love to watch the clouds sail through the sky and the snowflakes fall through the air. Everywhere we turn we find many things that give us happiness and contentment, and make the world a beautiful place for us to live in.

Year after year the world remains the same; it is always beautiful. Why do we sometimes enjoy



FIG. 2. Working in a "war garden" connected with a great manufacturing plant. So long as our bodies are strong and well we go to our tasks gladly and perform them with ease.

the pleasant things of life and at other times find ourselves unhappy in the midst of them?

Work not the cause of unhappiness. Every person who comes into the world has a work to do. Many persons think that it is this work that spoils the pleasure of life for them ; that if they could be freed from their tasks they would be happy. This idea is not correct. It is natural for man to work. Little children labor for hours over their block houses or their castles of sand. The blacksmith enjoys shaping the hot iron on his anvil. The artist delights in bringing out the picture with the strokes of his brush. And the pupil whose mind is alert finds enjoyment in the lessons he is called on to prepare.

On the other hand, a person who fails to do his work is unhappy and dissatisfied with his lot. The member of a family or of a school who is not trying to help the group to which he belongs is unhappy because he knows he is failing to do his share of the work. An idle man always comes to envy the man who is doing something and who counts for something among his fellow men. It is not work, but failure to do our work, that interferes with our pleasure in life.

Good health necessary for our enjoyment of the world. When our bodies are strong and well we rejoice in them ; we go to our tasks gladly and perform them with ease ; and we see and feel the beauty of the world. But when sickness and pain

come upon us we feel neither the joy of living nor the joy of work, and all the things that have been provided for our pleasure seem of little worth. Of all our treasures none is so precious as health; for it is health that opens to us the richness and fullness of life. But like every other good thing in the world, health can be secured and kept only with some effort and care.

Hygiene important because it teaches how to care for the body. It is the purpose of this book to teach you how to care for your body and keep it in health. The study of this subject is called *hygiene*. It is a most important subject, for its purpose is to teach you how you may be able to lead a happy, worth-while life.

QUESTIONS

1. Mention some of the things that make the world seem to you a good place to live in.
2. Do you think you would be happier if you had no duties to perform?
3. Are you happy when you are sick?
4. Give two reasons why this is true.
5. What is hygiene?
6. Why is the study of hygiene important?

Suggestions and topics for development. Call the attention of the class to the fact that the world's honors and rewards go to those who are able to accomplish its work, and that ordinarily health is a necessary condition for successful labor. It means much to a pupil who is carelessly inclined to have aroused in him a desire for worthy achievement, and there is no better approach to this subject than through hygiene. The biographies of emi-

nent men will show that a body capable of withstanding long-continued and arduous toil is usually one of the chief components of greatness, and there are many passages from the lives of the great men of literature that will help the teacher in showing the relations of health to life and work.

The teacher who uses this text will find Allen's *Civics and Health* (Ginn & Company, Boston), Shaw's *School Hygiene* (The Macmillan Company, New York), Broadhurst's *Home and Community Hygiene* (J. B. Lippincott Company, Philadelphia), McVail's *The Prevention of Infectious Diseases* (The Macmillan Company), and Lloyd and Bigelow's *The Teaching of Biology* (Longmans, Green & Company, New York), most useful in giving a background for the teaching of the subject. McKenzie's *Exercises in Education and Medicine* (W. B. Saunders Company, Philadelphia), Harrington's *Practical Hygiene* (Lea and Febiger, Philadelphia), Lusk's *The Science of Nutrition* (W. B. Saunders Company), and Jordan's *Principles of Bacteriology* (W. B. Saunders Company) are books of a more advanced nature, but they can be profitably consulted by even the non-technical reader. Ritchie's *Primer of Sanitation and Physiology* and *Human Physiology*, of the series which includes this text, will furnish more detailed information in regard to many of the topics discussed. These or other similar books should be at the command of the teacher, for there can be little doubt of the truth of Spencer's dictum that hygiene is the most important subject in the schools and that it should yield to no subject in the care with which it is taught or in the time devoted to it.

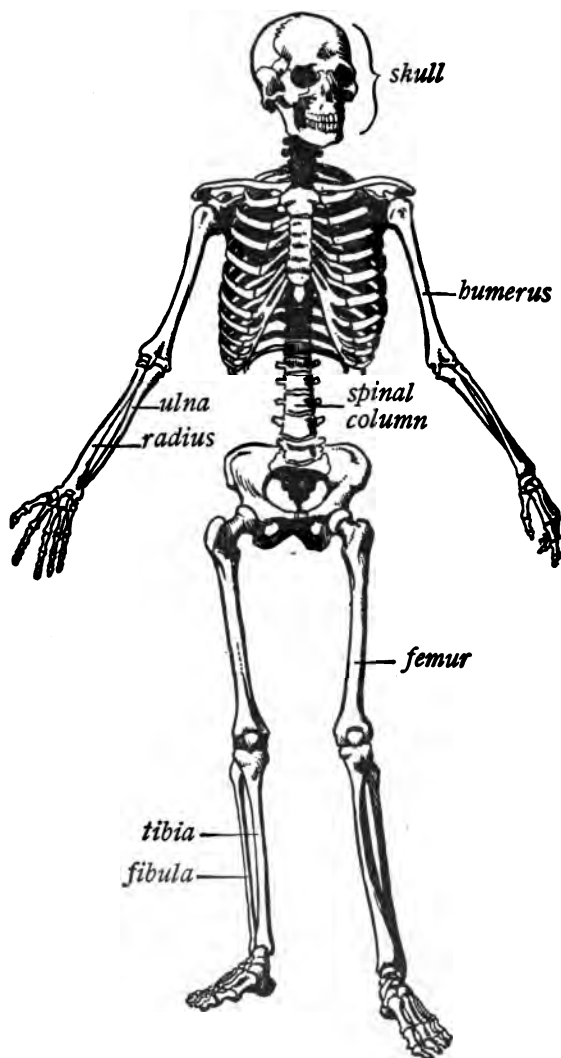


FIG. 3. The skeleton. The body is built around this strong framework of bones.

CHAPTER TWO

THE HUMAN BODY AND THE GREAT LAWS OF HEALTH

AN automobile is made of many different parts all put together to make one machine. So is the human body made of many different parts all joined together to make one whole. The driver of an automobile must know when his engine needs oil and gasoline and how to supply them. So we must understand the needs of our bodies and how to satisfy those needs. The driver must know how to keep sand and dirt out of the working parts of the engine and how to oil these parts so that they will not wear each other away. So we must know how to keep out of our bodies the germs that cause disease and how to give our bodies the exercise and

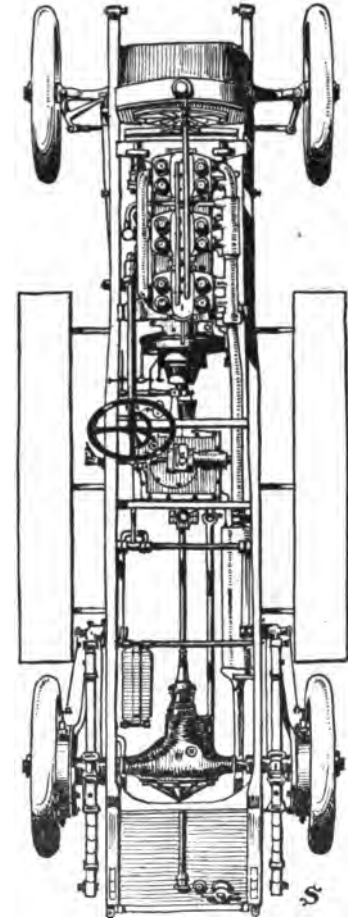


FIG. 4. The steel framework of an automobile gives it strength. It is the skeleton of the machine.

their health. In this chapter we shall study the parts of the body, the needs of the body, and the great laws we must observe to keep our bodies in health.

The parts of the human body. The human body is composed of a head, a trunk, and two pairs of limbs. It is supported by a strong framework of bones on which the whole body is built. The muscles to move this framework of bones are stretched over it in strong bands, and the skin forms a tough covering over the whole body.

The organs of the body. The bones and muscles form a thick wall about a large cavity in the trunk of the body. In this cavity are found many of the organs that do the work of the body. In the upper part of the cavity we find the heart, and lungs. In its lower part are the stomach, the intestine, the liver, the kidneys, and some other organs. In Figure 5 the organs are shown as they lie in place in the cavity of the trunk.

The uses of the organs. Each part of the body has a work to do. The bones give shape and strength to every part. Without them we should be as limp and shapeless as bags of sand. The muscles move all the body parts, and without the muscles we should be as motionless as trees or stones. The stomach and intestine receive food and prepare it for use; the heart keeps the blood moving through the body; and the lungs take in oxygen from the air. The hand has a work that the foot cannot do,

and the eye has a work that the tongue cannot do. In the same way each part of the body has a work of its own that can be done by no other part.

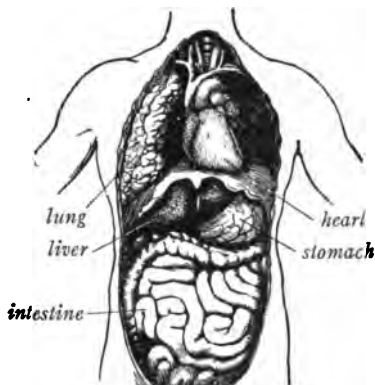


FIG. 5. The principal organs of the body. The left lung has been removed and the edge of the right lung turned back to show the heart and blood vessels more clearly.

The great laws of health. It is not enough for the driver of an automobile to understand the importance of taking care of his machine; he must also know how to do it. So, if we hope to have strong, healthy bodies, we must not only understand the importance of keeping the laws of health, but we must know what these laws are and how we can keep them.

Here are seven of the greatest laws of health :

1. The body must have a proper supply of food.
2. It must have plenty of fresh air.

3. It must get rid of its poisonous wastes.
4. It must be protected from the weather so that it will be neither too hot nor too cold.
5. It must be kept free from pain, and the mind must not be disturbed by constant fretting, anxiety, or care.
6. It must have exercise, rest, and sleep.
7. Disease germs must not be allowed to get into the body and poison it.

Every one of these laws must be followed if we are to keep our health and our strength. As a garden plant grows well when it has the right soil and the right amount of sun and moisture, so will your body have strength and vigor if its needs are satisfied and it is allowed to live according to the laws of health. And as surely as a plant wilts when its food or its supply of water fails, so surely must your body be injured if you break the great laws of its life.

QUESTIONS

1. Name the principal divisions of the body.
2. What forms the framework of the body?
3. What is stretched over the framework of the body to move it?
4. With what is the body covered?
5. What organs are in the upper part of the cavity of the body?
6. In the lower part?
7. What is the work of the bones?
8. Of the muscles?

9. Of the stomach and intestines?
10. Of the heart?
11. Of the lungs?
12. Name some other organs of the body and tell what they do.
13. Give some of the great laws of health.
14. What will happen to us if we keep these laws?
15. If we break them?

Suggestions and topics for development. When any one is absent from the school or grade on account of illness, let the teacher and pupils discuss the cause of the illness and whether it could have been prevented by reasonable care. Keep a record of all cases and at the end of the year find how many days have been lost on account of illness and how much of this illness might have been prevented. Keep developing the idea that health follows right living, and that each pupil is hygienically the architect of his own fate. Emphasize the thought contained in the following words: "To learn for the sake of learning alone is not the purpose of man upon the earth; learning must also express itself actively in its application to the problems of life."

CHAPTER THREE

FOODS AND THEIR USES IN THE BODY



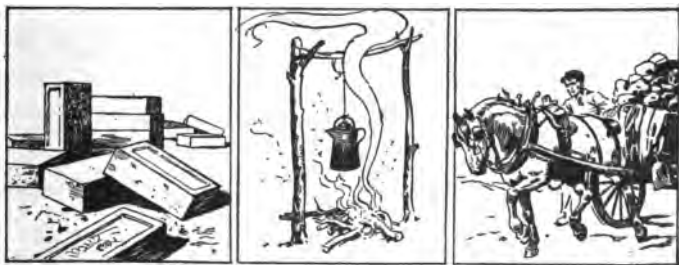
FIG. 6. We should eat plain, substantial foods that will supply the body's needs, and we should take our meals amid pleasant surroundings. We should form correct habits of eating while we are young, for habits once formed are likely to be carried through life.

WHEN a person goes without food for more than a few hours, he feels hungry. This means that his body needs food and is calling for it. If the person cannot get food, he will soon become weak and his body will waste away. Without food we cannot keep our health and strength. Without food we cannot even live.

Do you ever wonder why it is that you want to eat? Why one food is sometimes better for us than another food? Why a proper amount of food will give strength to the body, but too much food will

make the body ill? Why physicians tell us that a great part of our sickness comes from improper food? These matters are most important to us, and we shall therefore study foods and the uses that the body makes of them.

Foods necessary for building materials. Scrape the skin of your arm with a knife. Do you not find dead, dry scales on the knife? This dead material is all the time falling away from the skin, as particles of bark drop from the outside of a tree. The inner parts of your body also are wasting away. Yet your body does not become lighter and thinner. On the other hand, in young persons the body grows larger and becomes heavier year by year. This is because every particle of substance that wastes away in heart or muscle or brain or skin is replaced by new materials, and at the same time new substance is built up for making the body larger. This new material is formed from the food that we eat. *One great use of food is to furnish building material to the body.*



FIGS. 7, 8, and 9. Foods furnish the body with building material, heat, and strength.

The building foods. Among the more important building foods are lean meats, milk, and eggs. Bread and grains also contain large amounts of building materials, and so do peas, beans, cheese, and nuts. These foods give the body warmth and strength, but their main use is to furnish material for growth and repair. They can do this because they are composed of materials like those which make up our bodies. Only such materials can build up our bodies. Every day we must eat some building food, for night and day, whether we are asleep or awake, our bodies are wearing away.

Foods necessary to give heat to the body. The body is warmer than most of the objects around it. It is kept warm by the food that we eat just as a stove is kept warm by the wood or coal that is burned in it. *A second use of food is to furnish heat for warming the body.*

Foods necessary to give strength to the body. You have seen a great engine driving hundreds of machines, or you have watched a locomotive pulling a train. An engine gets its power to work from the coal that is burned in it. In the same way, when you lift something or when you run, your body gets its strength and its power from the food that it uses. *A third use of food is to give the body strength and power to work.*

The heating and strengthening foods. The second class of foods is the heating and strengthening foods.

These are the foods that contain the starches and sugars, the fats and the oils. We take sugar into the body mainly in fruits and in the foods to which we add it to improve the taste. Molasses, honey, sirups, and other sweet foods also contain large amounts of sugar.

Starch forms more than three fifths of our food. We eat it mainly in potatoes and in the foods made from grains — wheat bread, corn bread, macaroni, rice, and breakfast foods. A little starch is found also in such vegetables as turnips and cab-
bages.

The fats we get chiefly in meats, and in butter, cheese, and milk. Both fats and building material are supplied in peanuts, peanut butter, and soy beans, and in nuts such as pecans, hickory nuts, and walnuts. We also get fat in food cooked with lard, cottonseed oil or corn oil, and a little fat in fruits and vegetables. The



Bureau of Insular Affairs, P. I.

FIG. 10. Gathering coconuts. The oil is pressed from the dried meat of the coconuts.



FIG. 11. From leafy vegetables and milk we get the greater part of the substances that we must have in order to grow or even to live.

people of the tropics get much of the fat they use from the coconut. In our country coconut oil is now much used in cooking, and it is made into substitutes for butter. From a pound of fat or oil the body gets twice as much heat and strength as it gets from a pound of any other kind of food.

Other material supplied by foods. Besides supplying building material and giving heat and strength the foods must provide the minerals that the body needs. They must also supply *certain little-known substances that are necessary for health and life*. There are at least two of these substances. One is found in milk, butter, and yolk of eggs, and in smaller quantities in the leaves of such vegetables as lettuce, cabbage, and spinach. The other is present in the

leafy vegetables and in roots and tubers such as the potato, turnip, and carrot ; only a little of it is found in any grain, and most of that is lost when the grain is ground into meal or flour. If these substances are always lacking from its food, the body cannot grow, and after a time sickness and even death will result.

Selecting foods that will supply all the body needs.
At every meal we should have building foods and heating and strengthening foods, and some of these should contain the substances that make us grow. Then all of the food needs of the body will be supplied. Eating too much meat, not eating enough fat or building material, and failure to eat sufficient vegetables are common mistakes in selecting foods.

Learning to eat many different kinds of foods.
Nearly all of us like the things that we eat as children, and to a large extent we keep through life the habits of eating formed when we are young. You should therefore eat many different kinds of foods and learn to like them. You should guard against falling into the habit of eating only a few things and refusing to taste anything else. This is an important point ; for it is only by eating a variety of foods that one can be sure of giving the body all the materials necessary for health.

QUESTIONS

1. Name the first use of foods to the body.
2. Why must the body have building materials?
3. Name the more important building foods.

4. Give two other uses of foods in the body.
5. What materials do these foods contain?
6. Name some foods that contain starch.
7. Name some foods that contain sugar.
8. Name the foods from which we obtain fat.
9. For what is fat especially valuable in the body?
10. Why are milk, eggs, and leafy vegetables very necessary foods for children?

Suggestions and topics for development. Which needs more food: an animal that stays outdoors in winter, or one that is kept in a warm stable? Why? The kind of food eaten by the inhabitants of cold countries, and why. The kind of foods needed in especially large amounts by growing animals and children. Where a chick in an egg gets the lime for building its skeleton. The minerals needed by the body and where they are obtained. How food is stored in the body. Why a person is thin after sickness. What a frog or a bear lives on while sleeping through the winter. Why a person who is doing hard work needs large amounts of food.

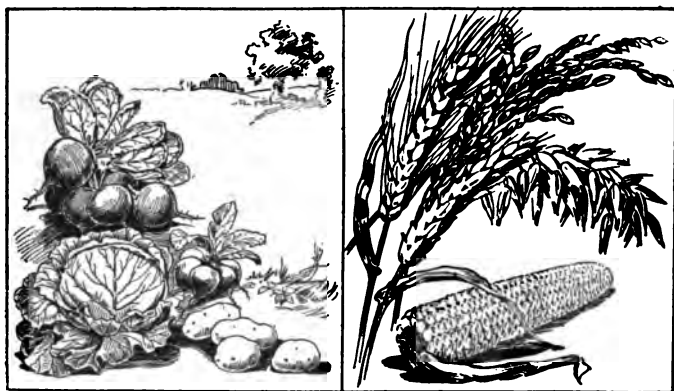
The teacher should learn as much as possible about the eating habits of the pupils, and if any of them are given to eating large quantities of sweets or lean meats, or of falling into other errors of diet, they should have clearly presented to them the fact that the body demands a balanced ration and that it will not receive such a ration from a diet of this sort.

There has been some objection among scientists to the use of the term "vitamin" as applied to the newly discovered growth-promoting substances. Many of them claim it is a misnomer because it implies that the substances are nitrogenous.

The teacher who understands chemistry will find profit in reading Lusk's *The Science of Nutrition* and Sherman's *Chemistry of Food and Nutrition*, both published by W. B. Saunders Company, Philadelphia, and McCollum's *Nutrition*, published by The Macmillan Company. Ritchie's *Primer of Physiology* and *Human Physiology* contain much additional matter concerning the nutrition of the body.

CHAPTER FOUR

FOOD ECONOMY



FIGS. 12 and 13. Grains furnish the body with heat and strength. They are the cheapest of all food and are used the world over. Vegetables furnish the needed bulk for the food.

THE Great War made it clear that there is hardly enough food in the world for everybody. During the war there was a great shortage of food, and that is why children as well as grown people made war gardens. We know now that if we do not produce what food we can, even in time of peace, somebody must go hungry. That is why we shall keep on making gardens at home and at school. We also know that if we waste food some one will suffer. And if we do not make a wise choice when we buy foods, our bodies will suffer even though we satisfy our stomachs.

A knowledge of food values is very necessary. Before the war, foods were much cheaper than they will ever be again, and it was not so hard to select

plenty of the right kinds of things to eat. But even then many people chose badly, and their bodies did not get the proper food materials. Now people everywhere have been trying to use cheaper foods in place of high-priced ones. Often they have changed to foods that do not give the body what it needs for health. The new foods may be cheap enough according to weight or bulk, but when they contain very little material that is useful to the body, they are really dear.

During a strike in Chicago a poor woman spent her last ten cents for lettuce to feed her hungry family. She did not know that lettuce is nineteen twentieths water, and that a pound of corn meal will furnish the body with as much heat and strength as will twenty-two pounds of lettuce, thirteen pounds of cabbage, or seven pounds of oysters. Therefore she was not able to make a proper selection of food for her family at a time when a wise choice was very necessary.

One who buys food for a family where the income is not large must watch the markets and learn to pick articles that are not high priced. At the same time the buyer must secure such a variety of foods that they will give the body enough of all of the substances that it needs. To do this is not an easy matter. And for any person to choose foods wisely requires a knowledge of the needs of the body and of the materials that are in the different foodstuffs.

How to select foods. Hard-working people and growing children need a great deal of the heating and strengthening foods, and these may form three fourths of all that they eat. Of such foods, the grains and products made from them, like flour, corn meal, rice, and oatmeal, are the cheapest. Next in low price and in heat and strength-giving value are white and sweet potatoes, which are cheap whenever they are plentiful. Sugar, molasses, and corn sirup furnish us with heat and strength at a little higher price than do the grains. Dried fruits contain sugar in a more expensive form than sugar and sirups. Fat meat, salt pork, bacon, butter, and cottonseed oil are all heat and strength giving, but cost more according to their food value than the grains and potatoes. Therefore, when we are buying our heating and strengthening foods, we shall do well to choose mostly grains and potatoes, with just enough fat or sugar-containing foods to give them flavor.

As the building foods cost more than the heating and strengthening foods, it is well to remember that we do not need nearly so much of them. We can also buy the cheapest of these foods, knowing that they furnish as much food value as the others. For example, a pound of round steak is more nourishing than a pound of porterhouse steak, and it is cheaper. A pound of dried beans gives almost exactly the same amount of building and strengthening

materials as a pound of roast beef, yet it costs only half as much. Other meat substitutes which allow

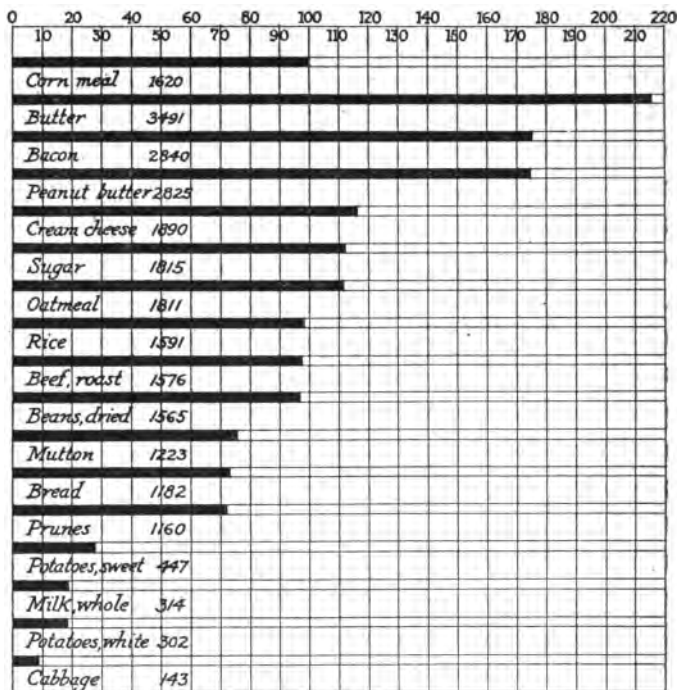


FIG. 14. The lines show the relative value in calories per pound for each of the foodstuffs named. The figures following the names give the actual calories; those at the top indicate the percentage values, corn meal standing for 100 per cent. A calorie represents the heat that it takes to raise the temperature of a kilogram of water (about a quart) one degree Centigrade (about two degrees Fahrenheit).

a saving in money are peas, soy beans, cream cheese, and peanut butter. If we have to choose between meat and milk, we should choose milk, as it is more

nearly a perfect food than meat. Even at eighteen cents a quart, milk is no more expensive than meat at thirty-five cents a pound. When eggs are expensive, we can use the same substitutes for them that we do for meat. When they are cheap, they are an economical building food, since they give nourishment almost without waste.

Besides the heating and strengthening and building foods, we must have foods which contain mineral salts and *those other substances that are found necessary to growth and health*. These are found in meat, milk, and leafy vegetables. If we are using substitutes for meat, or if leafy vegetables are expensive, we should buy more milk in order to get enough of these health-preserving substances.

QUESTIONS

1. Into what great classes may foods be divided (pages 14 to 16)?
2. Why is the proper selection of foods important?
3. What must one know in order to make a proper selection of foods?
4. What are the cheapest heat-giving and strength-giving foods?
5. How much of the total food of a working man may be made up of heating and strengthening materials?
6. What is lacking in a meal made up of bread, potatoes, and sirup?
7. From the list on page 22 select a number of foods which will supply heat and strength at a low price.
8. Select some which supply building material at a moder-

ate cost. Which do you consider the cheapest food in the list on page 22? The most expensive? Why?

9. Why must the food for every person include either milk or meat and leafy vegetables?

Suggestions and topics for development. Discuss the nutritive value of commonly used foods in relation to their current local prices. Many American families are underfed, and many children in particular do not take a sufficient total quantity of food to make normal growth and development possible. Hence pupils should be made to understand the possibility of supplying the needs of the body with low-priced foods. Keep in mind the value of those foods which enable us to eat with them large quantities of cheap foods like bread. Bring out the fact that variety cannot be sacrificed without involving a dearth of necessary mineral or regulating constituents. The unique place of milk in the dietary as a balanced food and as a source of minerals and vitamins should be made clear.

Obtain from the Secretary of Agriculture, Washington, D. C., the following Farmers' Bulletins: No. 391, on the Economical Use of Meat in the Home; No. 34, on Meats, Composition and Cooking; No. 121, on Beans, Peas, and Other Legumes as Food; No. 256, on Preparation of Vegetables for the Table; No. 565, on Corn Meal as a Food and Ways of Using It; No. 717, on Food for Young Children; No. 808, on How to Select Foods; and Department Bulletin 468, on Potatoes, Sweet Potatoes, and Other Starchy Roots as Food. At the same time obtain for use with the next two chapters, Farmers' Bulletin No. 142, on Principles of Nutrition and Nutritive Value of Food; No. 342, on Cooking Beans and Other Vegetables; No. 363, on The Use of Milk as Food; No. 375, on Care of Food in the Home; Nos. 389 and 807, on Bread and Breadmaking; No. 712, on School Lunches; Nos. 817 and 824, on How to Select Foods; Nos. 839 and 853, on Home Canning; and No. 984, on Home Drying of Fruits and Vegetables. All of these will be sent free on application. In the Appendix to Ritchie's *Human Physiology* (the fourth book of this series) the analyses of a number of foods are given. For a complete list of the analyses and comparative costs of foods, see Bulletin No. 28 of the United States Department of Agriculture, which may be obtained for ten cents from the Superintendent of Public Documents, Washington, D. C.

CHAPTER FIVE

COOKING FOODS

Few foods taste better or are more easily digested than crisp toast made from well-baked bread. And few foods are more disagreeable to eat or harder to digest than half-baked, doughy rolls. Yet the toast and the rolls are made from the same materials. The difference is in the way they are cooked.



FIG. 15. Good cooking is necessary to good health, and a skillful cook has a right to be proud of his work.

The importance of cooking food well. No matter how carefully our foods are chosen, they will not do us the most good unless they are well cooked and properly served. The subject of cooking is so large that it would fill a whole book, but here we can speak of only a few of the most important points in regard to it.

The cooking of starchy foods. Raw starch is in little hard grains that are digested very slowly. When placed in hot water, these grains swell up into a soft mass. This softened starch can then be easily digested. Oatmeal or corn meal that has been cooked for only a short time is very difficult to digest, but if either of these foods is thoroughly cooked in a double boiler, it is very easy to digest. Well-baked



Signal Corps, U. S. A.

FIG. 16. A United States Army rolling kitchen. Fireless cookers are used in preparing food for soldiers on the march.

bread is the "staff of life," and every healthy person can digest it. But half-baked bread, with the starch grains in it almost as hard as little bits of wood, is ruinous to the digestion.

The use of fats in cooking. Fat is a most valuable heating and strengthening food. But, like every other food, it may injure the body if it is taken in a wrong way or in too large amounts. When fat has been made very hot, as often happens when food is fried, acids that injure the stomach are formed in it. Also, when foods are coated with fat, the digestive juices cannot get at them and they are digested very slowly. For this reason many foods are much harder to digest when fried than when cooked in other ways. Greasy crullers, pancakes, and other fried foods are injuring the digestive organs of many people.

The importance of pleasing the taste. The human body is not so simple as an automobile engine, which runs if it is supplied with gasoline. To give the body the food materials that it needs is not enough. This is because the digestion of any food depends in part upon how one feels. If the mind is cheerful, the

digestive organs will be able to do their work better, and for this reason it is important to please the taste.

Where new foods are being substituted for more expensive ones, care will be necessary to make the new foods agreeable to the taste. With a little study these foods can be prepared in a variety of ways and they can be combined to make appetizing dishes.

QUESTIONS

1. Why should starchy foods be well cooked?
2. Name some starchy foods.
3. What injurious substances are formed in fat when it is heated very hot?
4. Why are fried foods harder to digest than foods that are cooked in other ways?
5. Why is it important to please the taste?

Suggestions and topics for development. A teacher may do much for the community in which she is working by discussing with the girls of her school the best ways of cooking different foods, bringing samples of her own cooking to school and having the girls do the same, and in general by showing that she is interested in the best methods of preparing foods for use. Many good books on the subject may be obtained; and there are persons in every locality whose methods of cooking are worthy of study and imitation by others. It is not necessary for a teacher to wait for a department of domestic science to be established before making a beginning in this work. The fact that the teacher considers the subject of sufficient importance to receive serious consideration will in itself have a most wholesome effect on the mental attitudes of the pupils. Discuss methods of cooking some of the cheaper foods so that they will be acceptable substitutes for those that are more expensive. Make use of the Farmers' Bulletins listed at the end of Chapter Four.

CHAPTER SIX

. CARING FOR FOOD



FIG. 17. Foods should be kept away from the hands of the public and from dust and flies.

IF a piece of meat is left in a warm place, it will soon spoil. But if it is thoroughly cooked and tightly sealed up in a can, it will keep for years. Or if it is placed where it will remain frozen, it will not decay. Every fisherman or farmer knows that salt helps to keep fish or meat from spoiling, and the housekeeper puts sugar in her fruits to keep them from souring, or to "preserve" them.

What is it that causes food to spoil? Why is it that food will keep if it is canned, or dried, or frozen, or heavily salted, or preserved in sugar? What must we do with our foods when we want to keep them from spoiling and becoming unfit for use?

Spoiling of food caused by bacteria. Spoiling and souring of food are caused by *bacteria*. These are plants so very small that we can see them only with a microscope. Some kinds of bacteria are able to grow in our bodies and cause sickness. These kinds

we call disease germs. Many kinds of bacteria that do not cause disease can grow in our foods and cause them to spoil so that they become unfit for use. *The important thing in the care of foods is to keep bacteria from growing in them.*

Keeping bacteria out of food by cleanliness. We give bacteria a chance to get into food by allowing dust to blow into it; by allowing flies to crawl over it; by allowing mice, rats, and roaches to run about in pantries; by keeping the food in dirty vessels; by washing it with dirty water; by handling it with unclean hands; and in general by failing to keep it clean. *Cleanliness is the first great point in caring for food, since it keeps bacteria from getting into the food.*

Keeping bacteria from growing in foods by cold. Bacteria grow very slowly in foods that are kept cold, and by keeping foods cold we can do much to prevent their spoiling. Do not leave in a warm kitchen milk, meats, cooked fruits, or other food that will spoil. Put them at once into a refrigerator with plenty of ice. A good refrigerator does not have to be an expensive one, and it will save its cost many times over in food that would otherwise be



FIG. 18. Food should be kept in a refrigerator, and there should always be enough ice in the refrigerator to keep the food cold.



FIG. 19. Food put up in this manner keeps because the bacteria in it have been killed by heat and the cans have been sealed so that no more bacteria can enter.

lost. If ice cannot be obtained, food should be bought or cooked only as it can be used. *Cold is the second great point in the care of food, since it keeps bacteria from growing in the food.*

Killing the bacteria in food with heat. Cooking food kills the bacteria in it and for a time keeps the food from spoiling. Milk vessels and other vessels in which food is kept should be scalded with hot water before they are used. If this is not done, great numbers of bacteria will get into the food from the vessels and will quickly cause it to spoil.

Bacteria sometimes grow in canned meats or vegetables and produce very strong poisons. These are destroyed by heat; and any canned foods that

seem in the least spoiled should be heated to boiling before they are used or even tasted.

Keeping disease germs out of foods. Persons who are sick and persons who are caring for the sick often have dangerous disease germs on their hands. It is never safe for these persons to handle food, for if the germs get from their hands into the food other people are likely to catch the disease. No one who has consumption or who has lately had typhoid fever should have anything to do with the handling of food. All foods should be carefully guarded from flies, for the fly is a great carrier of dangerous germs.

The danger in using food preservatives. There are many acids and other substances that will prevent the growth of bacteria in milk and other foods, and will keep the foods from spoiling. Some of these are sold in drug stores or by agents, and are used by housekeepers, especially in canning fruits. Though some are harmless, others are poisonous, and their use in foods offered for sale is forbidden by law.

QUESTIONS

1. What causes foods to spoil?
2. What are bacteria?
3. How can food be kept from spoiling?
4. Mention some ways by which bacteria get into food.
5. What is the first great point in caring for food?
6. Why do foods keep longer when they are cold?
7. Where should foods be kept?
8. What is the second great point in the care of food?

9. How can the bacteria in foods be killed?
10. How can the germs on milk vessels and food vessels be killed?
11. Why should this be done?
12. How do disease germs often get into food?
13. Is it wise or unwise to use food preservatives?

Suggestions and topics for development. The importance of proper care of food and food receptacles. Fill small, clean bottles or jars with milk or cooked fruits. Keep one in a warm room, the other in the coldest place possible. Let the children notice which sours first. When both have become sour, empty the bottles, scald one carefully, rinse the other with cold water, and refill. Put them away together and let the children watch for signs of souring.

Good and bad methods of caring for milk. The importance of keeping free from germs the milk given to a baby. The care of school lunches. If the children patronize cafeterias or lunch wagons, explain the danger of using foods exposed to dust and insects or to indiscriminate handling. Practical methods of keeping flies out of a kitchen. How to destroy flies and cockroaches. Many practical suggestions for the care of foods will be found in the bulletins listed at the end of Chapter Four.

CHAPTER SEVEN

THE DIGESTIVE ORGANS AND THEIR WORK

SUPPOSE that you are hungry and hold a piece of bread in your hand. Your brain, your muscles, and all the parts of your body need the bread to nourish them. How can you get the bread to them? By eating it, of course. It may seem strange that the way to the brain is down the throat; but this is the road the food must travel to get to any part of the body that needs it.

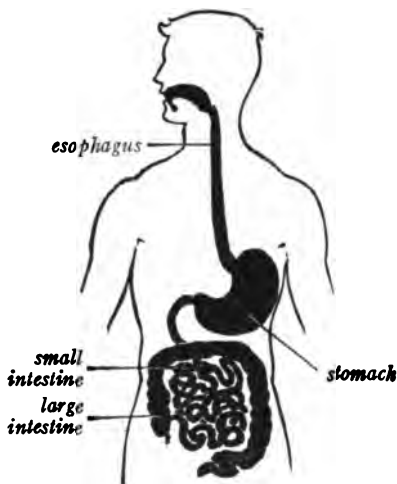


FIG. 20. The alimentary canal.

Is a piece of bread as you hold it in your hand ready to be used by the different parts of the body? What happens to it after you eat it? We speak about digesting our food, but what do we mean by *digestion*? We hear people talk about having trouble with their digestive organs. What organs are these, where are they, what do they do? What difference does it make to us if they do get out of order? In this chapter we shall find the answers to some of these questions.

Where the food goes after it is eaten. After the food is eaten, it passes from the mouth into the

throat, and then into the *esophagus*. At the lower end of the esophagus it enters the stomach, and from the stomach it passes on into the small intestine and the large intestine. As the food passes through this long canal, it is digested and then taken through the walls of the intestine into the blood.

What happens to food during digestion. The food that we eat goes into the stomach in a dough-like mass. Before it can be used by the body, it must pass through the wall of the intestine and get into the blood. To get through this wall, the food must be dissolved. The saliva of the mouth and the juices in the stomach and intestine *act on the foods*

in such a way as to dissolve them. The process of dissolving the food is called *digestion*, and no solid food can get into the blood until it has been digested.

Digestion in the mouth.

In the mouth the food is ground into pieces by the teeth, and is mixed with the saliva. The saliva dissolves some of the starch and thus begins the process of digestion. The saliva comes from three



FIG. 21. The salivary glands. Each gland forms saliva and empties it into the mouth through a little tube or duct.

pairs of *salivary glands*. These lie under the tongue, under the back corners of the lower jaw, and in the

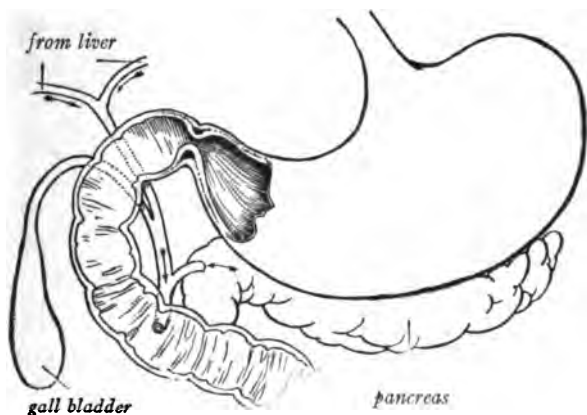


FIG. 22. The stomach.

cheeks below and in front of the ears. Each gland is a small structure that forms saliva and empties it into the mouth through a little tube or duct.

The stomach. After the food has been ground by the teeth and moistened by the saliva, it is swallowed and passes down into the stomach. One use of the stomach is to serve as a storehouse for food, so that a considerable amount of food can be eaten at one time and kept until the body can use it. The stomach also pours out *gastric juice* on the food. The gastric juice digests a large part of the meat, eggs, and other building foods and gets them ready for use in the body. An acid in the gastric juice kills most of the

bacteria that get into the stomach in food and water, and thus helps to protect us from disease germs.

The liver and the pancreas. The liver, which weighs nearly four pounds, lies on the right side of the body, opposite the stomach. It makes a greenish yellow liquid called *bile*. The bile flows into the small intestine through a duct from the liver and assists in the digestion of food. The pancreas is a long, flat organ that lies below the stomach. It has a duct that joins the duct from the liver and empties into the small intestine. The juice from the pancreas does a very important part of the work of digesting the foods in the small intestine. It finishes the digestion of the building foods and also digests starches and fats.

The small intestine. All along the walls of the small intestine are little glands that pour out juices to help in the digestion of the food. The small intestine is more than twenty feet long, and it takes four or five hours for the food to pass through it.

Digestion in the small intestine. The juices from the liver and pancreas are poured in with the food while it is in the small intestine, and the juices from the intestinal glands also are mixed with it. As the food moves slowly along the intestine, the juices finish the work of digestion. The food then soaks through into the great network of little blood vessels that are in the wall of the intestine, and is carried all through the body. Thus the solid food that we

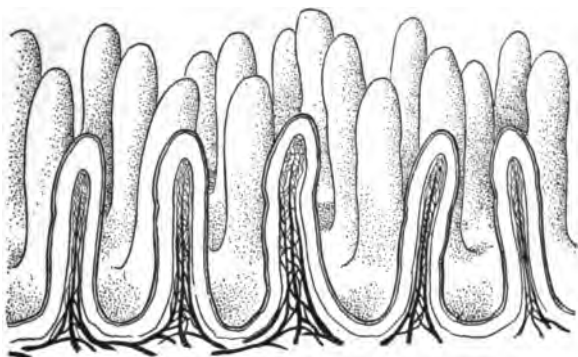


FIG. 23. The lining of the small intestine is thickly covered with little finger-like structures called *villi*. The digested food is absorbed into blood vessels that are in these structures. The picture shows villi highly magnified.

eat is dissolved and taken into the body to nourish all its parts.

The large intestine. In all food there is some refuse matter like the woody material in cabbages and potatoes, the skins of fruits, and the tough fibers of meats. This matter passes on into the large intestine. Nothing is more important to the health than getting this refuse matter cleared out of the large intestine every day. To fail to attend to this duty daily is to break one of the great laws of health.

The importance of caring for the digestive organs.

“It is not what we eat but what we digest that makes us strong.” This is an old saying, and it is a true one. We cannot have strong bodies if we do not have healthy digestive organs to prepare food for them. In the next chapter we shall study how to keep the digestive organs in health.

QUESTIONS

1. What do the digestive juices do to the foods during digestion?
2. What digestive juice is found in the mouth?
3. Where does it come from?
4. How many pairs of salivary glands are there?
5. Where are they found?
6. Give two uses of the stomach.
7. What kind of foods does the gastric juice digest?
8. What does the acid in the gastric juice do?
9. Where in the body is the liver?
10. How heavy is it?
11. What liquid comes from it?
12. Where in the body is the pancreas?
13. Into what is the juice from the pancreas emptied?
14. How long is the small intestine?
15. What is found along its walls?
16. How long does it take the food to pass through the small intestine?
17. What is happening to the food while it is passing through?
18. Where does the food go after it has been digested?
19. What part of our food goes on into the large intestine?
20. Why is it important for us to care for our digestive organs?

Suggestions and topics for development. Where the gastric juice comes from, and what habits the pupils have that may interfere with the flow of it. Work out the continuous story of the movements and digestion of food in the alimentary canal.

CHAPTER EIGHT

KEEPING THE DIGESTIVE ORGANS IN HEALTH

"AN army travels on its stomach." This saying, or one like it, has been repeated by the world's greatest generals, and it is said that Napoleon once remarked, "A soldier is a stomach." Of course these words do not mean exactly what they seem to say. What they do mean is this,—that no matter how brave a soldier is, he cannot do his best if he does not get enough food or if his stomach is out of order. Our happiness and usefulness in life depend very much upon the way we digest our food. But to know this truth is not enough. Napoleon knew it, yet he died of a disease of the stomach. To keep the digestive organs in health requires *doing* as well as *knowing*.

Exercise and the digestive organs. Physical exercise gives the muscles and nerves a tone and a vigor that they lack without it. The digestive organs seem to catch this vigor from the muscles and nerv-



FIG. 24. A hardy American soldier. It was because he was well fed that he was able to conquer.

ous system; for when we exercise, almost anything we may eat is digested without difficulty. If we fail to exercise and allow our muscles to become soft, our digestive organs lose their energy and do not do their work as they should. Spirited labor and sports like ball-playing, rowing, hill-climbing, swimming, and riding are necessary. The excitement of such work or play is needed to put the body in the best condition, and gentle walking, mild games, or dull labor will not serve the same purpose.

Happiness and cheerfulness as aids to digestion.

“Contentment is the best sauce.” This old saying means that a cheerful mind will help us more than anything else to enjoy our food and to digest it. And the saying is true, for the mind rules the nervous system, and the nervous system has much to do with the digestion. So if we are worried and unhappy, the work of digestion may be slowed down or even stopped for many hours. When food lies undigested in the stomach or intestines, bacteria grow in it. These bacteria cause the food to sour and decay. Poisons from this spoiled food may remain in the body and do harm to it long after the cause of the trouble is forgotten. This is why meals should be served amid pleasant surroundings, and why meal times should be made the most cheerful hours in the day. It is a rule of politeness that one should never talk of disagreeable things at meals, and no rule has better reason. Any-

thing that is said at the table should add to the enjoyment of the meal.

The importance of thoroughly chewing the food. Some people make it a rule to chew every mouthful of food to a fine paste, and this is a very good habit to form. If sugar is in fine grains it mixes more quickly with water than if it is in large, hard lumps, and it is much the same with food.

Food that has been ground into bits by the teeth is more quickly mixed with the juices in

the stomach and intestines than food that has been swallowed in large pieces. Chewing our food will help very much to give us a good digestion, and a good digestion will help us make sure of having good health.

Drinking liquids at meals. A glass or two of water may be taken at meal times, but it should be taken in small sips. In that way it moistens the food and helps to mix the saliva with it, and this causes the starch to be digested more quickly. If more water than this is taken it hinders digestion, espe-



FIG. 25. William Ewart Gladstone, who was called "England's Grand Old Man." He believed that his vigorous old age was in large part due to his habit of cutting his food into small pieces and chewing it thoroughly.

cially if the food is washed down without being properly chewed. The water should not be ice cold, because cold drinks chill the stomach and delay digestion. Coffee and tea hinder the work of the saliva, and these drinks should be used very little by any one. They should never be given to young children, and they should be avoided entirely by those who have trouble in digesting starchy foods.

Eating too much at one time. Another common cause of bad digestion is eating too much. Do not overload your stomach by giving it more food than it can digest for hours. If you do, the food will sour in your stomach and you will suffer.

Eating a whole meal of one kind of food. Sometimes a child wants to make a whole meal of chicken, green peas, syrup, cake, strawberries, or some other single food that he likes. Eating in this way makes one of the digestive juices do all the work, while the other juices are idle. This causes digestion to go on very slowly, and there is trouble in the stomach before digestion is finished.

Eating at irregular times. Our digestive organs are ready to digest a meal at the time at which we usually eat. Therefore you should not eat dinner at twelve o'clock one day and at two o'clock the next day. Do not get so busy at your play that you do not have time to eat, and do not form the habit of eating at irregular times or whenever you can get something that you like to eat. Have regular hours



FIG. 26. Outdoor life and exercise are very important in keeping the digestive organs in health.

for eating and give your digestive organs a chance to rest between meals, for they need time for rest just as much as your muscles do.

Nourishing lunches. School children who cannot go home for their meals at noon, often eat lunches that are made up mostly of some one article, as pie, cake, candy, fruit, or ice cream. Those who do so will sooner or later suffer as a result. A good school lunch must have building as well as heating and strengthening foods, and it should be planned as carefully as any other meal. Some city schools now serve well-prepared lunches. Where this is done the teachers find that many pupils gain in health and do better work than before.

Coarse foods necessary to health. The body needs plenty of such foods as wheat bread, corn bread,

potatoes, cabbages, turnips, and other foods that have large amounts of tough refuse matter in them. These bulky materials cause the wastes to be more promptly moved along the large intestine. This is very necessary, for if the wastes are allowed to lie in the large intestine bacteria will grow in them and form poisons. These poisons will then pass through the wall of the intestine into the blood, poisoning the whole body and causing headaches. Those who live upon the choicest and most expensive foods have health little or no better than have those who live on the plainest and simplest fare. Probably the principal reason for this is that those who live simply get more of the coarser kinds of food and the wastes are more promptly moved along through the intestine.

Alcohol injurious to the digestive organs. Beer, wine, and whisky contain alcohol, and they are all harmful to the digestive organs. They injure the stomach especially and interfere with its work, so that hard masses of food pass undigested into the intestine. Bacteria then grow in this food and form poisons that are carried through the body. Alcohol is also one of the chief causes of disease of the liver.

QUESTIONS

1. Why is it important to keep the digestive organs in health?
2. What must we do in order to get any benefit from the study of rules of hygiene?

3. What effect has exercise on the digestive organs?
4. What effect on digestion has thorough chewing of the food?
5. How does one's state of mind affect digestion?
6. Why should water be taken at meals?
7. What harm will a glassful of water do if it is all taken at one time at a meal?
8. What is the best rule to follow in the use of tea or coffee?
9. Why can we not eat enough food at one time to supply us all day?
10. Why should every meal be made up of several kinds of food?
11. Why should we eat at regular hours every day?
12. What are some good foods for lunch?
13. Of what is candy chiefly made?
14. Why should one eat only a small amount of candy at one time?
15. Why are coarse foods necessary?
16. What effect has alcohol on the digestive organs?
17. What is the best rule to follow in regard to the use of alcoholic drinks?

Suggestions and topics for development. Healthful school lunches. Necessity for the leisurely eating of school lunches. Soda fountain drinks.

Illustrate absorption by showing how salt or sugar dissolved in water will pass through a paper. Show digestion by putting a cube of hard-boiled white of egg into a glass of water with a few drops of acid and a little pepsin. The lining of a calf's stomach dried and pulverized may be used instead of pepsin. Prepare materials in another glass in the same way, but first cut the egg into fine pieces to show the advantages of thoroughly chewing food. Set both glasses in a warm place (about 100 degrees is best) for a few hours.

CHAPTER NINE

THE CARE OF THE TEETH

THE mouth cavity has been called the Gateway of Life, and the care of the mouth may well be called

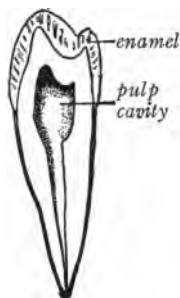


FIG. 27. The structure of a tooth.

the first step on the Highway to Health. All about us are persons who pay a great deal of attention to the purity of their food. Yet the teeth of many of these persons are so unclean and so decayed that they cannot chew a single bite of food without filling it with millions of bacteria. It is hardly worth while to take care of food for a person who is going to spoil every bit of it before he swallows it, and the health of the nation demands that the people have a better understanding of the importance of the teeth.

Importance of caring for the teeth. In the United States army a man is not accepted as a soldier unless his teeth are in good condition. This is because bad teeth mean poor digestion, and without good digestion no man is fit for the hard service of a soldier. Some foreign life insurance companies employ dentists to care for the teeth of their policy holders, because they find it is cheaper to do this than to pay for the sickness and deaths that are caused by bad teeth. Medical inspection of 275,000 school children in New York City showed that more than

one half of them had teeth that needed treatment, while dental inspection made of the public school children in Boston and in Cleveland showed that from 95 to 97 per cent of the children had teeth needing attention.

Unclean and decaying teeth a cause of ill health. Unclean teeth and decaying teeth form a breeding place for millions of bacteria of many different kinds. These bacteria become mixed with the food while it is being chewed, and all day they are passing down the throat in streams. In the stomach and intestine they ferment and spoil the food, and in this way seriously interfere with the health of the body. Decaying teeth and sore gums also cause people to swallow their food without chewing it properly, and we have already learned how this is harmful to the digestion. It is believed also that bad teeth are a cause of adenoids (page 70) and of trouble in the nose.

Unclean teeth and bad teeth a cause of germ diseases. Bad teeth and unclean teeth cause disease in two ways. In the first place, they interfere with the digestion and weaken the body, so that if disease germs get into the body we are not able to resist them. One of the first things to do in the treatment of a consumptive is to get the teeth in good condition, so that the food will nourish the body and build up the strength. In the second place, unclean and decaying teeth allow disease germs to enter the

body. The same germs that cause sore gums, abscesses in the mouth, and decay in the teeth, also cause tonsillitis, sore throat, appendicitis, and rheumatism. Many cases of heart disease and kidney disease are due to the same cause. Often germs are carried in the blood from diseased teeth to other parts of the body, where they set up their growth; and there is no doubt that bad teeth cause not only indigestion but also many other forms of disease.



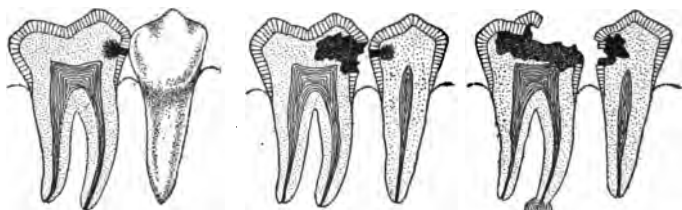
FIG. 28. Hang your toothbrush up separately, for if several brushes are kept in the same holder they bring together many different kinds of germs. (After Ferguson's *A Child's Book of the Teeth*.)

Decay of the teeth caused by failure to keep them clean. Decay of the teeth is caused by bacteria growing in the matter that sticks to the teeth and lodges between them. Clearly, then, the way to keep the teeth from decaying is to keep them clean. They ought to be cleaned every time they are used, just as our dishes are washed every time they are used. To keep them sound they ought at least to be washed after breakfast and before going to bed. Washing the mouth thoroughly with salt water before breakfast saves the digestive organs from the millions of bacteria that have grown in the mouth during the night. In cleaning the teeth,

brush them thoroughly both inside and out, and brush them downwards rather than sidewise. A moderately stiff brush should be used, even though the gums bleed at first, for the gums need the exercise. A tooth powder or tooth paste is a great help in getting the teeth clean. It is very important to remove food from between the teeth, for decay nearly always begins in the places where the food lodges. Sore gums can usually be cured by keeping the teeth clean.

Bad teeth a cause of decay in other teeth. As germs from a case of diphtheria may spread through a whole classroom and cause the disease in every child in the room, so germs may spread from a cavity in a tooth and cause decay in other teeth. We should therefore watch for decayed teeth and have them attended to promptly, because a single neglected tooth may cause the decay of several others.

Visiting the dentist. No matter how faithfully one may brush his teeth he cannot keep them entirely clean without the aid of a dentist. Between the teeth and particularly between the back molars there are narrow spaces which the brush cannot reach. It is also hard to clean the pits in the grinding surfaces of the teeth or to keep material from collecting along the gums by using a brush. Particles lodged in these spaces quickly become filled with bacteria, which form acids that destroy the enamel of the teeth. Mineral salts from the saliva



H. W. Ferguson, D.D.S.

FIGS. 29, 30, and 31. Both of these teeth might have been saved if they had been attended to at the first sign of decay, or even when they were as shown in Figure 30. In Figure 31 pus has formed at the foot of the molar and the tooth will have to be pulled.

are deposited over these masses of bacteria, forming hard films which no amount of brushing will clear away, although a dentist can easily remove them. A visit to the dentist should be made once every three months to have the teeth cleaned. He can then find and fill any small cavities before they become large enough to be painful or to make pulling necessary. The loss of a tooth is a serious matter for it affects the grinding power of four others, and no bridgework or artificial teeth can cut and grind the food so thoroughly as the natural teeth.

The danger of breaking the enamel. The exposed part of a tooth is covered with a layer of very hard, glistening, white material called *enamel*. This is brittle like glass, and can be easily chipped and broken. If the enamel of a tooth is once broken off, it is never replaced, and the tooth is likely to decay. Biting on hard objects like nuts, opening a knife blade with the teeth, picking the teeth with

a pin or metal toothpick, and similar acts, should be avoided, as they are likely to splinter the enamel.

Caring for the first set of teeth. The first set of teeth need the care of a dentist as much as the second set. Bad teeth are harmful to a child as well as to a grown person. If his food is not properly chewed and if bacteria are constantly passing down his throat, the child must suffer just as any one else would. And a toothache or other pain is likely to have worse effects upon a child than upon an older person. If cavities in the teeth of the first set are not filled, the decay may spread to the teeth of the second set as they come in. If the first teeth are pulled, the jaws sometimes fail to grow as they should, and for lack of space the second teeth may come in crowded and uneven. Another important reason for keeping the first set of teeth sound is to prevent the child from forming the habit of swallowing his food unchewed.

Straightening irregular teeth. Because of breathing through the mouth, thumb-sucking, insufficient use in chewing, or for other reasons, the teeth sometimes come in crooked. This not only makes them less useful than they should be in chewing the food, but spoils the appearance of the face. Wonders in straightening the teeth can be done by a dentist who understands this kind of work. Not only can irregular teeth be straightened, but the crowded teeth of a young person can be spread apart, and the bones of the jaw can be made to grow until the teeth have



Jackson's Orthodontia

FIGS. 32 and 33. The first of these plaster casts was made before this boy's teeth were straightened. The second cast was made after the work was completed. The boy's teeth were saved and his appearance improved; but trouble and expense might have been avoided if his teeth had been cared for from the very beginning.

room. In this way a weak-looking chin can be made to grow into one that is square and strong.

The advantage of having good teeth. Good teeth are important from the standpoint of health, but there are still other good reasons why you should keep your teeth white and clean. See how many of these reasons you can give.

QUESTIONS

1. Mention some facts that show how important the teeth are.
2. Tell two ways in which bad teeth injure the health.
3. Give two ways by which bad teeth cause germ diseases.
4. What causes decay in teeth?
5. How can decay be prevented?
6. How often ought the teeth to be cleaned?
7. Why is it important to remove particles of food from between the teeth?

8. What effect has a decaying tooth on the other teeth?
9. Tell why it is best to visit a dentist regularly every three months to have the teeth given the care that they need.
10. What is enamel?
11. Mention some ways in which the enamel may be injured.
12. What often happens if the enamel on a tooth is broken?
13. Why should the first set of teeth be cared for by a dentist?
14. What should be done with crowded and uneven teeth?
15. Some one has said, "A pearl in the mouth is worth two on the neck." What do you think this means?

Suggestions and topics for development. Why a tooth aches. (Illustrate structure by decayed teeth, which may be secured from a dentist.) How to distinguish the first permanent molar from a temporary tooth. What happens to meat or other food matter if it is left in a warm place like the mouth. Dental plaques; how the dentist removes them. What it would cost to buy tooth-brushes for a person for twenty years, and what it costs to have a badly decayed set of teeth repaired. Emphasize the idea that regular examination by a dentist is cheap and effective insurance against pain, loss of teeth, and ill health due to decayed teeth. One of the most important medical discoveries of recent years is that many (probably most) cases of chronic rheumatism, heart disease, kidney disease, catarrh, and other serious ailments are due to infections in the tonsils, at the roots of the teeth, or in the cavities of the bones of the face. From these foci of infection the germs spread to other parts of the body, and often the only successful treatment for these chronic diseases is to clean up the permanent breeding places of the germs that cause them. The care of the teeth is more important than it was believed to be until very recently, and the teacher should give this topic special attention.

The first permanent molars, which come in about the sixth or seventh year, are often mistaken for temporary teeth and are

allowed to decay. Count the double teeth; when there are **three** double teeth on one side of the jaw, the back one is a **permanent** tooth.

Ferguson's *A Child's Book of the Teeth* (published by World Book Company, Yonkers-on-Hudson, New York) will be found very helpful, especially with younger pupils.

CHAPTER TEN

THE AIR WE BREATHE

WHEN our armies were making their victorious drive in France, the soldiers sometimes endured hunger and thirst in spite of the fact that the retreating enemy had left stores of food behind and that there were wells and springs everywhere. But the men would touch neither water nor food until it had been examined and found fit for use. Yet when dense clouds of poison gas came rolling across the fields, these same men kept breathing, although they knew that to take it into the lungs would cause intense suffering and possibly death. Spoiled food and unclean water we can refuse, but the air that comes to us we must breathe, whether it be pure or impure. Nearly a thousand times an hour we take a fresh supply into the lungs. It is clear that no dwelling, schoolhouse, or factory should be built without providing some way of giving the people who must live or work in it a supply of fresh, life-giving air.

Why the body must have air. About one fifth of the air is *oxygen*. Oxygen is constantly used in the body, and without it we cannot live for even five minutes. Set a glass vessel over a burning candle so that no air can get in, and you will see the flame slowly die out for lack of oxygen. So the heat and strength and life of your body will die out if its supply of oxygen is cut off. *The first reason why the body needs air is to get oxygen.*

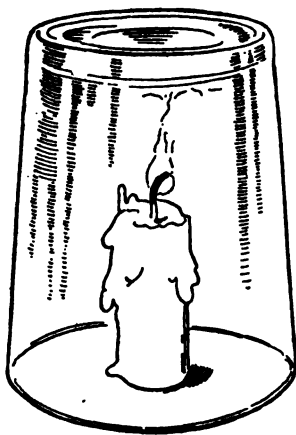


FIG. 34. Experiment showing that a flame cannot burn without oxygen.

All the time we are breathing out from the lungs a gas called *carbon dioxid*. In too large quantities this gas is poisonous. We must therefore keep breathing the air into the lungs in order that, as it passes out again, it may carry the carbon dioxid out of the body. *The second reason why we must have air is to get rid of carbon dioxid.*

Heat is constantly being produced in the body, and to keep the body temperature from rising too high this heat must be given off. It is lost chiefly through the air that comes in contact with the body and by the evaporation of the sweat from the skin (page 85). *The third reason why we need air is to carry off the body heat.*

Why ventilation is necessary. Under ordinary conditions we have plenty of oxygen and we do not suffer because of too much carbon dioxid. But though the air in a room may be fit for breathing, ventilation is necessary for the proper regulation of body heat. The important points in ventilation are the temperature and motion of the air, and the amount of moisture in it.

Moisture, temperature, and motion important in ventilation. In crowded rooms the air is often filled with moisture, causing the people to suffer from overheating and headache. In such rooms the temperature should be kept down to 65 degrees, or even lower; as much fresh air as possible should be admitted; and motion should be set up in the air by opening doors and windows or by electric fans.

In rooms heated by hot air, the air is often very dry and evaporates the sweat very rapidly. Persons in such a room may then feel chilly even if the temperature is as high as 75 degrees. Where heating systems of this kind are used, there should be some arrangement for moistening the air until the rooms will be comfortable at 68 degrees or lower.

How to obtain fresh air. Every school building or other building where many people gather together ought to have some system of forcing in fresh air and drawing off the air that has been used. Where this has not been provided for, we must get as much fresh air as possible in some other way. By a little experimenting, it will often be found that certain windows in a room can be opened without causing harmful draughts on any one. Opening several windows a little is usually a good way to ventilate a room. A common method is to fasten a board inside a window at the bottom, letting it slope to form a kind of trough (as shown in Figure 35). When the

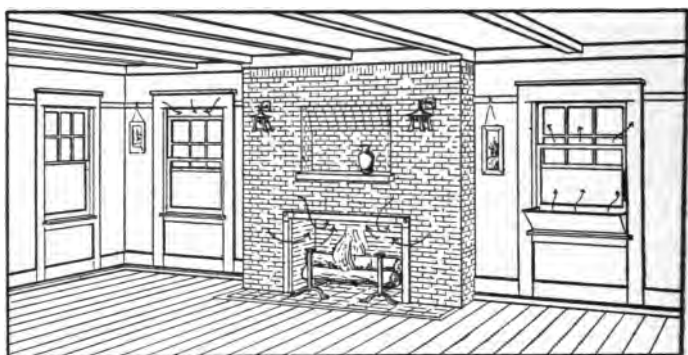


FIG. 35. How a fireplace and a window board help to ventilate a room. The arrows show which way the air is moving.

window is raised, the board causes the entering air to rise sharply upward. The fresh air will then not cause draughts over the people in the room. At the same time another window on the same side of the room is lowered from the top. Often by lowering all the windows slightly at the top a great deal of the hot, moist air in a crowded room can be got rid of without causing cold draughts. Schoolrooms should be filled with fresh air while they are empty, and at noons and recesses the windows should be raised and the fresh air allowed to pour in. If the school has no recess, all the windows should be widely opened for a few minutes at the middle of the session, while the pupils go through one of the exercises outlined in Chapter Twenty-seven.

Getting fresh air while we sleep. The best place to sleep is out in the open, where the warm air that

comes from the lungs is blown away from the face. The body should, however, be warmly covered to protect it from the cold. Great benefits come from sleeping in the open all the year round. This is shown by the fact that the health of persons who have consumption or pneumonia often becomes much better when they make it a habit to sleep out-of-doors.

Sleeping porches and window tents. Where the weather is often bad, or where open-air sleeping is impossible, the best thing to do is to use a sleeping porch. This should be roofed over to give protection from the weather, but left open on three sides. In summer time it should be carefully screened to protect the sleeper from insects, for these are often carriers of disease. If the house has no such porch and if one cannot be built, you can always open the windows of your sleeping room. A screen should be placed so that you will get plenty of fresh air, without being in a draught.

In cold climates a window tent may be used. Such a tent is made of canvas stretched over a wooden or metal frame which fits into the lower half of a



FIG. 36. The best kind of sleeping room is out-of-doors. This one was planned when the house was built.



Cabinet Mfg. Co.

FIG. 37. One type of window sleeping tent.

window and comes down over the head of the bed. One can be bought ready made or one can be arranged at home. When the tent is in place and the window is open, the cold air comes into the tent and to the head of the sleeper, but it cannot pass into the room. In this way one may have plenty of fresh air without having to get up in a cold room.

You spend one third of all your time in bed, so you cannot hope to have a healthy body if you care for it only two thirds of the time and make it do without fresh air while you sleep.

Methods of heating and ventilating. Gas and oil heaters that have no pipes for carrying away the gases give off great volumes of impurities ; and to heat

a sleeping room with one of these stoves is unhealthful. Stoves and furnaces that leak coal gas also are unhealthful. A fireplace gives good ventilation because it sends a current of air up the chimney, and this draws more air into the room. Vessels of water should be kept on stoves and on or behind radiators to add moisture to the air. When plants grow well in a room the air is moist enough to be healthful to breathe.

QUESTIONS

1. How much of the air is oxygen?
2. Why must the body get rid of carbon dioxide?
3. What are the three reasons why the body must have air?
4. Why is ventilation necessary?
5. What are the important points in ventilation?
6. At what temperature should a crowded room be kept?
7. What trouble is there with the ventilation of buildings that are heated with hot air?
8. How may this be remedied?
9. Explain how a schoolroom may be ventilated without causing draughts.
10. What may be done at recess to change the air in a room?
11. Why is it important to have sleeping rooms well ventilated?
12. What is the best of all sleeping places?
13. How is this proved?
14. In what other ways may we secure abundant fresh air while sleeping?
15. What methods of heating bring fresh air into a house?

Suggestions and topics for development. Ritchie's *Primer of Physiology* gives a more complete presentation of the newer ideas on ventilation than is possible in the limited space in this book.

CHAPTER ELEVEN

THE LUNGS AND AIR PASSAGES AND THEIR CARE

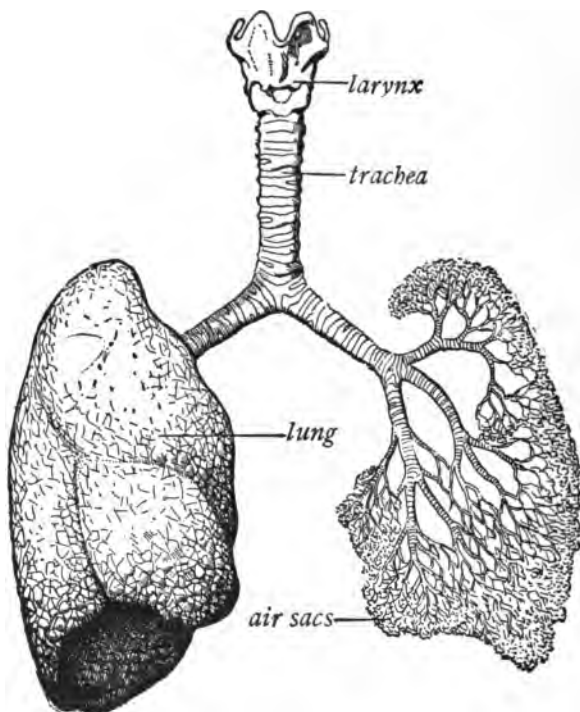


FIG. 38. The lungs. At the right are shown the branches of the trachea and the air sacs in which they end.

OF all the organs of the body, the lungs and air passages are most often attacked by disease germs. Colds, catarrh, and bronchitis are so common that no one entirely escapes them, while consumption causes thousands of deaths every year. When influenza and pneumonia spread over the United

States during 1918 and 1919, the loss of life was several times as large as it was among American soldiers as a result of the Great War. Yet every person can do much to avoid these diseases by taking care of his breathing organs, by keeping his body in good condition, and by getting enough fresh air. We have learned some ways to secure pure air; now we are going to learn how to care for the organs of breathing, which get rid of carbon dioxid and take in oxygen for the body.



FIG. 39. The air passages of the head and throat.

The air passages. The air enters the nose through the nostrils and passes down into the throat through two openings at the back of the mouth. It then goes down the windpipe (trachea), which divides and enters the two lungs. These large branches of the trachea divide into smaller and smaller branches, as a tree divides into small limbs and twigs, and these smallest branches end in little air sacs. The lungs are mainly composed of millions of these little tubes

*American Blower Company*

FIG. 40. A corner of a factory in which bricks are handled. The funnel-like pipes carry off the dust that the workers would otherwise have to breathe.

and the air sacs at their ends. The air which we breathe passes down the windpipe and out through the tubes into every one of these sacs.

The blood purified in the lungs. In the thin, delicate walls of the air sacs of the lungs are great numbers of very small blood vessels. As the blood passes through these vessels in fine little streams, it takes up oxygen from the air in the sacs and gives off carbon dioxid. The carbon dioxid is then breathed out of the body, and when the next breath is taken in, more oxygen is drawn down into the lungs.

The danger of breathing dust. Most of the diseases of the air passages and lungs are germ diseases.

Dust causes these diseases, not by carrying germs into the air passages, but by wounding the walls of the air passages so that germs already in them may get a chance to start growing. In such trades as stonecutting and metal grinding, more than one half of the workers died of diseases of the lungs until means for keeping down dust were employed. Since this was done, the deaths from lung diseases in these trades have very greatly decreased. Facts of this kind show how great is the danger of breathing dust, and how much care should be taken to keep it from getting into the air that we breathe.

Keeping down dust. The streets of cities and towns should be kept sprinkled, and where it is possible, they should be cleaned by flushing them with water instead of by sweeping them. Sweeping

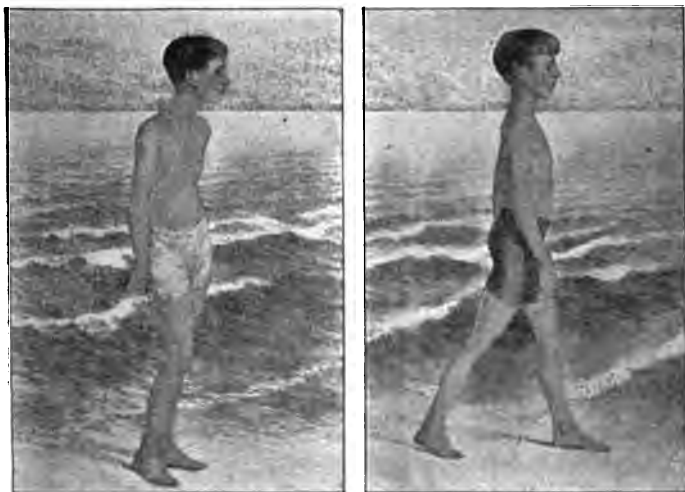


FIG. 41. The best way to free a house from dust is with a vacuum cleaner.

both in schoolrooms and in private houses ought to be done with the windows open and in a way to stir up as little dust as possible. The best way to clean a room is with a vacuum cleaner. With one of these it is possible to get rid of the dust more completely than in any other way. Dust on furniture should not be stirred up into the air, but should be wiped off with a damp cloth (a piece of flannel soaked in paraffin oil is best for this purpose). Everything possible should be done to keep down dust, for where people are forced to breathe it, great numbers of them die from diseases of the air passages and lungs.

The harmfulness of crowding the lungs. When a person sits at his desk with his shoulders bent over, the muscles are not able to pull the ribs up in breathing, as they could do if he were sitting erect. Also, the stomach and liver push up and crowd the lungs from below. This causes the lungs to be only partly filled with fresh air.

The lungs can also be crowded by tight clothing about the chest, which keeps the ribs from moving freely; or by tight belts or other tight clothing about the waist, which force the liver and stomach upward and hinder the movements of the lungs. Great harm can be done to the lungs by crowding them in either of these ways. In another chapter (page 95) we shall discuss the best way of keeping the body erect.



FIGS. 42 and 43. The boy at the left crowds his lungs by walking with his shoulders stooped. The other boy gives his lungs a chance to develop. He breathes deeply because he walks erect.

The effect of tobacco smoke on the air passages and lungs. Tobacco smoke causes the lining of the air passages to become inflamed, and many smokers have "smoker's sore throat." The worst effect of tobacco, however, comes from taking the smoke into the lungs, as cigarette smokers almost always do. This is especially injurious to the body, because large amounts of the poisonous matter in the tobacco smoke pass through the thin walls of the air sacs into the blood and are carried all through the body. Smoking also causes a shortness of breath, as the cigarette smoker who tries to win a race very well knows.

The effect of alcohol on the lungs. The chief harm that alcohol does to the lungs and air passages is to weaken their power to resist disease germs. It has long been known by physicians that pneumonia is much more likely to kill a user of alcohol than a non-drinker, and that drinkers suffer far more from consumption than do persons who use no alcohol.

Breathing exercises. You should stand erect several times a day and take a few long, deep breaths. If you have been sitting quietly at your work for some time, it will make your tired muscles more comfortable to spend a few minutes in going through one of the breathing exercises given on pages 144 to 146. If this is done before an open window, you will go back to work greatly refreshed. It is good for the whole body to have the carbon dioxide emptied out of the lungs, a fresh supply of oxygen taken in, and the heart made to send the blood more quickly on its way. Vigorous breathing exercises should not be practiced by persons who are sick or weak, however; and they are very injurious to consumptives. No one should practice breathing exercises long enough to make himself dizzy.

QUESTIONS

1. What are some of the most common diseases of the organs of breathing?
2. How can we, to some extent at least, avoid these diseases?
3. How does air get into the trachea?

4. Of what are the lungs principally made up?
5. How does the air get into the air sacs?
6. How does oxygen get into the blood?
7. What is given off in exchange for oxygen?
8. In what two ways may dust cause injury to the air passages and lungs?
9. Name some dusty trades, and tell how you know that it is dangerous to breathe dust.
10. What is the best way to clean the streets of a town or city?
11. How should a room be swept?
12. What are the effects upon the lungs of a stooping position?
13. Why is this injurious?
14. How should clothing and belts be made to fit?
15. What is the chief harm that alcohol does to the organs of breathing?
16. What proportion of all deaths is caused by pneumonia and consumption?
17. State three ways in which the habit of smoking does harm.
18. What are the advantages of breathing exercises?
19. What persons should not take them?

Suggestions and topics for development. Plain furniture and floors finished for use with rugs compared from a hygienic point of view with carpeted floors and plush-covered furniture. The cost of laying a hardwood floor over another floor compared with the cost of an equal area of carpet. How your schoolroom can be swept without raising dust. The use of streams of water, air blasts, or other devices for keeping down dust in workshops. Use the breathing exercises, pages 144 to 146, to freshen your pupils as they become tired toward the end of the day's work.

CHAPTER TWELVE

ADENOIDS AND ENLARGED TONSILS



FIG. 44. This picture was made on the 24th day of June just before these girls were operated on for adenoids.

THERE are certain troubles of the nose and throat which do not often cause either sickness or pain, but which narrow or close the air passages and keep the person from getting a sufficient supply of air. These diseases often go on for years without being discovered, but they are serious and should be promptly treated when found. How common these troubles are is shown by the fact that in 415 villages of New York State it was found that nearly one eighth of the school children were breathing through the mouth instead of the nose.

The evil effect of breathing through the mouth. Mouth breathing causes the upper teeth to turn forward and the lips to thicken and turn out, thus spoiling the appearance of the face. What is more

serious, it allows millions of bacteria to get into the mouth, and it allows cold and dusty air to reach the throat and lungs. Worst of all, the general health of the mouth breather is weakened. The cause of mouth breathing is usually adenoid growths or enlarged tonsils.

Adenoids. Examinations have shown that in moist climates as many as one sixth of all the children of school age may have adenoids. These are soft, spongy bodies that grow high up in the back of the throat (Figure 46). Sometimes they become so large that they partly or entirely close the passages from the nose into the throat, so that the person must breathe through the mouth. They are often the cause of deafness also. The usual signs of adenoids are breathing through the mouth, a narrow upper jaw and crowded teeth, thick lips and a run-



FIG. 45. Children improve in health and appearance after they are free from adenoids. This photograph of the girls who are shown in Figure 44 was made on the 28th day of December in the same year.

ning nose, difficulty in talking, inflamed eyes, and deafness. In most cases the inner corners of the

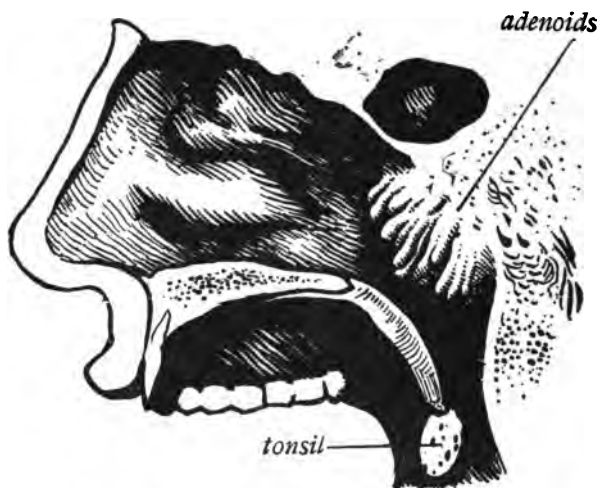


FIG. 46. Adenoids grow high in the throat and block the openings from the nose into the throat.

eyes are drawn down, and the face has the strained expression that you see on the faces of the children in Figure 44. Many children who have adenoid growths are smaller than they ought to be, some of them have difficulty in keeping up with their classes, and sometimes adenoids have the strange effect of causing the child to be restless, idle, stupid, quarrelsome, and a general mischief-maker.

Enlarged tonsils. The tonsils are located one on each side of the throat. Sometimes they become infected with germs and so swollen that they almost

close the opening of the throat. When 275,000 children in the New York City schools were examined, more than one fourth of them were found to have enlarged tonsils. Such tonsils cause mouth breathing, and the germs from them are a continual danger to the voice, the lungs, and the digestive organs.

The importance of treating adenoids and enlarged tonsils. Does your nose become stopped up whenever you take a little cold? Do the other members of your family tell you that you sleep with your mouth open and that you snore? Is it hard for you to keep your nose clean? Do you talk through your nose? Are you troubled with earache or deafness? Do you suffer from tonsillitis, or do you have any other of the symptoms of adenoids?

If you are troubled in any of these ways, ask your parents to take you to a physician, who, by a very small operation, can remove the cause of your troubles. Do not allow any one to persuade you to wait until you outgrow adenoids; for while you may outgrow the adenoids themselves, the ugly shape of the mouth and lips, the narrow air passages in the nose, and the deafness that the adenoids cause will remain through life. Besides, you can no more get fresh air through a closed nose than through a closed window, and it is almost as hard to grow into a strong, healthy man or woman while you are struggling for air as it would be to do so without sufficient food.

QUESTIONS

1. How does mouth breathing change the shape of the mouth?
2. What are the worst effects of mouth breathing?
3. To what is mouth breathing usually due?
4. What are adenoids and where do they grow?
5. What are some of the results of adenoids?
6. Where are the tonsils?
7. What are some of the results of enlarged tonsils?
8. Why should adenoids or enlarged tonsils be removed as soon as they are found?
9. Is it reasonable to wait to outgrow such troubles?

Suggestions and topics for development. Watch pupils for symptoms of adenoids and enlarged tonsils. Insist that the pupils be provided with handkerchiefs, for the habit of mouth breathing may be started by allowing the nostrils to become blocked with mucus.

CHAPTER THIRTEEN

THE BLOOD AND THE HEART

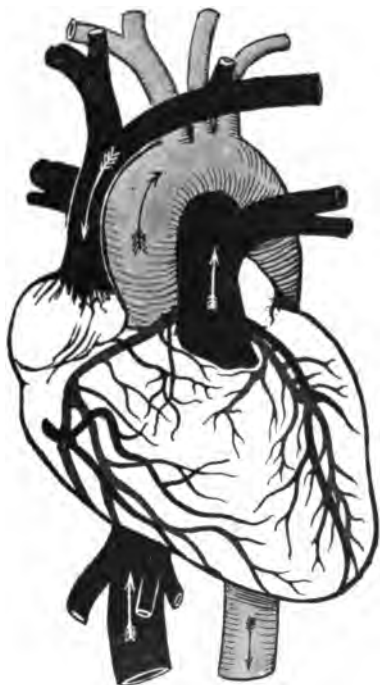


FIG. 47. The heart.

SUPPOSE that in a great city all the wagons that deliver groceries and milk, and all the carts that haul away rubbish and garbage, should stop running. The grocery stores might have large supplies of food, but the food could not be taken to those who needed it, and there would be suffering and starvation throughout the city. The garbage cans would

become filled to overflowing, and so much waste matter would collect that it would be impossible to dispose of it. The very life of the city depends on having some way of carrying food to every part of it and some way of taking away the wastes.

Your body is much like a city. Every part of it must have food and oxygen brought to it, and every part must have its wastes carried away, or it cannot live. We are now to study how this work is done.

The blood. The blood carries everything that is to be moved from one part of the body to another. It takes up the food which passes through the wall of the intestine and the oxygen that comes in from the lungs. It carries these all through the body, and supplies them to the muscles and the brain and the other body parts. It also takes up the wastes of all the organs and brings them to the lungs and kidneys, where they are thrown out of the body. To do this work, the blood must travel swiftly through the body night and day as long as the body is alive.

The heart. Place your hand on the left side of your chest and you can feel your heart beat. Count how often it beats in a minute. As the heart beats it pumps the blood through the body. Day after day and year after year it must work to keep the blood flowing through the body.

The blood vessels. The blood vessels are hollow tubes or pipes. There are two great sets of them connected with the heart and running everywhere

through the body. One set is called the *arteries*. They carry the blood out *from the heart* to every part of the body. The other set of blood vessels is called the *veins*. It is their work to collect the blood from all parts of the body and bring it *back to the heart*. Near the heart the blood vessels are very large, but through all the body there are thousands of little blood vessels, so small and so close together that you cannot run the point of the finest needle into your flesh without breaking many of them.

Violent exercise injurious to the heart. If you should run up and down stairs two or three times, or run a hundred yards at top speed, you would find your heart beating much harder and perhaps twice as fast as it beats when you are sitting quietly in your seat. From this you can imagine how enormously the work of the heart is increased by Marathon races, hard bicycle riding, football, rapid and long-continued skipping of the rope, or hour after hour of tennis playing. When the heart is overworked, it often becomes enlarged and diseased, and this condition is found so often among those who engage in hard games and sports that it is called



After McKensie

FIG. 48. Long races, where the runners suffer from exhaustion and collapse, are too severe for boys.



FIG. 49. A tug-of-war. Moderate sports give health as well as pleasure to those who take part in them.

“athlete’s heart.” Rapidly-growing boys and girls are especially liable to have their hearts injured by very severe games and long races, for the body gains in size and weight faster than the heart increases in size and strength. They should therefore take their exercise in a way that will not put too great a strain on the heart.

The effect of alcohol on the heart. Alcohol often causes the heart to become weakened; and in drinkers, especially beer drinkers, great quantities of fat sometimes gather about the heart. In this condition the heart cannot do its work properly; and in sicknesses like typhoid fever or pneumonia, it is likely to fail. Alcohol often causes the walls of the blood vessels to become hard and brittle. Strokes of paralysis and apoplexy (which are caused by the

bursting of a blood vessel in the brain) are far more common among drinkers than among those who do not use alcohol.

Headache remedies. There are a number of drugs that will relieve the pain of a headache, and many people have the habit of dosing themselves with one of these drugs as soon as a headache comes on. There are two reasons why this is an extremely bad habit. Headache remedies merely stop the pain and do nothing to relieve the indigestion, eye strain, or other condition which caused the pain. All such headache remedies weaken and slow the action of the heart, and if used often they may cause serious injury.

How to stop bleeding from a wound. If the blood flows from a wound in spurts, the blood vessel that has been cut is an artery. The bleeding can be stopped by twisting a cord or a knotted handkerchief above the wound, as shown in Figure 50. If the blood flows in a steady stream, the cut vessel is a vein; in this case the bandage should be placed below the wound. The bandage should be twisted only tight enough to stop bleeding. It should not be allowed to stay on more than half an hour, or there may be serious injury to the part, from a total stopping of the circulation. The injured part of the body should be kept raised. If the cut vessel is a large one, it is necessary to act very quickly, and some one should press on the part to stop the bleeding until the bandage can be made ready. If the

wound is on the head or body, a thick cloth should be pressed firmly down upon it. A physician should be called as quickly as possible.

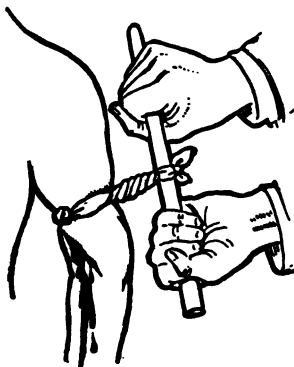


FIG. 50. Checking bleeding from a wound.

Bleeding from the nose.

Bleeding from the nose may often be stopped by simply pressing the upper lip against the teeth, or against a small ball of paper or some other object placed between the teeth and the lip. Bathing the neck in cold water may also help to check the bleeding. The head should be held erect in nose bleed-

ing, so that as little blood as possible will run to the nose. Do not blow the nose, for this will often start the bleeding afresh.

QUESTIONS

1. In what ways is the body like a city?
2. What does the blood do in the body?
3. Where is the heart?
4. How often does your heart beat in a minute?
5. Why does the body live only so long as the heart beats?
6. What are the two sets of blood vessels called?
7. What do the arteries do?
8. What do the veins do?
9. What effect has exercise upon the heart?
10. Name some forms of exercise that put a great strain on the heart.

11. What effect has alcohol on the heart?
12. On the blood vessels?
13. Give two reasons why the use of headache remedies is a bad habit.
14. Tell how to stop bleeding from a cut in the body or head.
15. From the nose.
16. From a cut in the arm or leg.
17. What harm might a tight bandage do if allowed to remain in place too long?

Suggestions and topics for development. Usually a class has several pupils in it who, barring infections, will grade almost one hundred per cent on a health basis. The hygienic habits of such children are usually good, and the other pupils may very profitably be taught to look to these as the ones in the room who are grading highest in the art of physical living. One great secret of this art is the avoidance of excesses, and the pupil should be made to see the absolute necessity of bringing his judgment and will power into play in the regulation of his own life.

An advertising scheme frequently employed by manufacturers of patent medicines is the publication in newspapers of columns of "Medical Advice." These take the form of letters, each of which states a group of symptoms. The reply to each letter recommends the use of some secret proprietary medicine. Point out that no reputable physician would attempt to prescribe for a patient without having more information than is supplied by these letters; also that the advisers invariably recommend patent preparations rather than ordinary household remedies. Warn pupils against the use of medicines of unknown composition.

CHAPTER FOURTEEN

THE KIDNEYS

EXAMINE a slaughtered animal as it hangs in a meat market and you will find two dark red organs

fastened to the back wall of the body. They are bean-shaped, and lie half buried in fat, one on each side of the backbone.

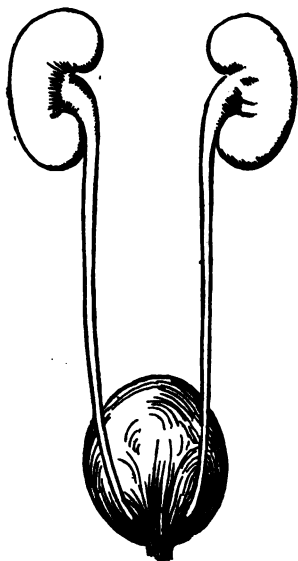


FIG. 51. The kidneys and the bladder.

What are these organs? They are the kidneys. What do they do? They take wastes out of the blood. Is their work important? Their work is as important as the work of any other organ of the body, for if they fail to act the wastes will poison the body and cause death.

How the kidneys remove the body wastes. A large blood vessel passes into each kidney and sends branches into every part of it. As the blood passes through the kidneys, the kidneys purify it by taking the wastes out of it, just as the lungs purify the blood by taking the carbon dioxid out of it. The wastes from the kidneys are carried to the bladder by a duct from each kidney.

Keeping the kidneys in health. The kidneys have to remove the body wastes, and are best cared for by caring for the whole body. There are, however, some things that should be avoided if possible. Among the things that are especially likely to injure the kidneys may be mentioned the lifting of heavy weights, exposure to cold and wet, indigestion, eating too much meat, and especially the drinking of alcohol, which is one of the most common causes of kidney trouble.

One habit which has a very good effect upon the kidneys is that of drinking much water. The wastes which the kidneys remove from the body must be dissolved in water. Many cases of lumbago and other troubles due to failure of the kidneys to do their work properly are much improved or cured when a glass of water is taken once every hour or so throughout the day.

QUESTIONS

1. Where are the kidneys found in the body?
2. What is their function?
3. Name some things that injure the kidneys.
4. What effect have alcoholic drinks on the kidneys?

Suggestions and topics for development. It is well to emphasize the unity of the body and the necessity of taking care of the general health for the sake of the parts. *The Wonderful One-Hoss Shay* may be read to the class and the application of the poem to the human body made. In later life the kidneys and the heart are in very many cases the weak parts, and good habits ought to be formed early in order to conserve these organs as much as possible.

CHAPTER FIFTEEN

THE SKIN



After Sorolla's "The Swimmers," in Metropolitan Museum of Art

FIG. 52. Swimming is an invigorating way to take a bath. It is also one of the best forms of exercise, because it brings into play the muscles of all parts of the body.

THE living parts of the body are extremely delicate and tender, and if they were exposed to hurts, to drying, and to disease germs they could not live. We therefore have over the whole body a tough coat which protects the delicate living body parts. The inner part of this coat is alive, but the part which comes in contact with the outside world is dead and keeps falling away in dry scales.

The structure of the skin. The skin is composed of an outer layer called the *epidermis* and an inner layer called the *dermis*. The dermis has no blood vessels in it, but its inner part is alive and

keeps growing to take the place of the outer part that is all the time dying and falling away. Everywhere in the skin are little sweat glands that pour out the sweat on the surface of the skin.

The skin is a regulator of the body heat. The temperature of the healthy body, winter and summer, is about 98.6 degrees. It remains the same because the skin regulates the heat of the body. This it does in two ways. When we are hot, the blood vessels in the skin open up and allow the blood to come to the outside of the body, where it can be cooled. When we are cold, the vessels in the skin close up and keep the blood in the warm, inner parts of the body. Another way in which the skin regulates the heat is through the sweat glands. These assist in cooling the body by pouring out water on the skin. If the sweat glands fail to work, the temperature of the body goes too high and we have fever.

Wet the hand and hold it up to the wind. Do you feel your hand being cooled as the water evap-

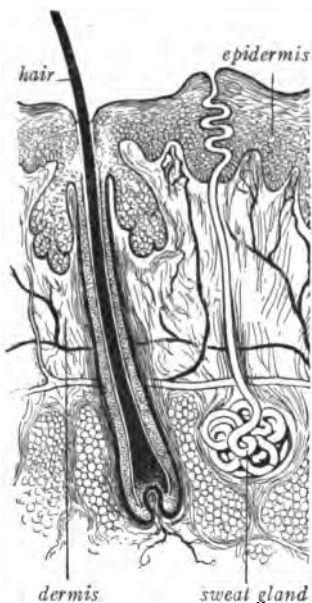


FIG. 53. A section of the skin, highly magnified.

orates from it? Or pour alcohol or gasoline over the hand and allow it to dry off. Do you feel that your hand is being cooled? Suppose the air was so moist that the sweat could not evaporate from the skin. Would it cool the body to have the skin wet with sweat? On what kind of day do we suffer most from heat?

The hair. The hair grows from the epidermis, and like the outer layer of the epidermis the hair is dead. It contains no blood vessels, and there is no sense of feeling in it. The growth of the hair is at the root. The hair is composed of the same material as the outer layer of the skin.

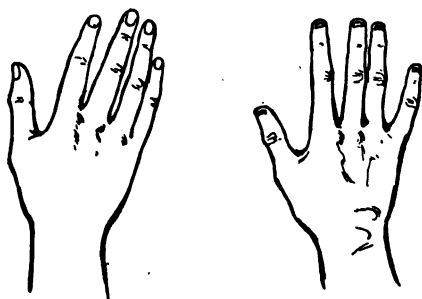
Each hair stands in a little pocket of the epidermis that is folded down deep into the dermis. Opening into this small pocket are little glands that pour out oil around the root of the hair. Brush your hair thoroughly and it will become smooth and glossy from the oil that you work out from around the roots. Fine hairs are found all over the body, and the oil that comes from the glands at the roots of these hairs keeps the skin from becoming dry.

The care of the hair. In the care of the hair nothing is so important as thoroughly brushing it. This brings the blood into the scalp and spreads the oil along the hair. The hair should not be wet every time it is combed, for the oil will be washed off, making the hair too dry. The head should be washed occasionally with good soap to cleanse the

hair and remove the scales and dirt from the scalp. Dandruff is caused by germs growing in the oil glands and in the little pockets about the hairs. One person can get this disease from another, and for this reason public combs and brushes should not be used. To cleanse the scalp of dandruff, tincture of green soap will be found better than ordinary toilet soap.

The nails and their care. A nail is a portion of the outer layer of the epidermis that is very much thickened and hardened. Its growth is at the base. When a nail is lost a new one will grow in its place if the bed on which the nail rests is not destroyed; but if this bed has been destroyed, the nail will not grow again.

The finger nails should not be bitten off, nor should they be trimmed "to the quick," for this will spoil their shape. They should be allowed to grow long enough to protect the ends of the fingers, and the



FIGS. 54 and 55. Well-kept finger nails and nails that have been bitten off.



FIG. 56. A modern bathroom. Use of the special tooth basin keeps germs from the mouth from getting into the wash basin.

space beneath the ends of the nails should be kept free from dirt.

The toe nails should be cut squarely across — not trimmed around the edges. If ingrowing nails occur, the edges may be lifted by pushing very small wedges of cotton under them.

Bathing. "Tolerate no uncleanness in your body, clothes, or habitation" was one of Benjamin Franklin's rules for success, and few men have understood the secrets of success better than he. Finger nails that are in mourning, greasy hair, soiled and unbrushed clothing, unclean teeth, and the lack of a needed bath cause a person to be disagreeable to those about him. Such conditions greatly hinder usefulness and success.

Cold baths. Those who take a daily cold bath do not catch cold so easily as do others, and many strong, vigorous persons are greatly benefited by this practice. Weak and sick people, however, and especially those who are inclined to be nervous, should not take cold baths except upon the advice of a physician. The safest rule to follow in bathing is to use lukewarm water unless you can take a cold bath with pleasant results.

QUESTIONS

1. What use has the skin?
2. Name the layers of the skin.
3. What do the sweat glands do?
4. What is the temperature of the healthy body?
5. Explain the two ways of regulating the heat of the body.
6. In what does a hair stand?
7. Where does the oil for the hair come from?
8. Does a bird have oil for its feathers?
9. Explain how brushing benefits the hair.
10. What is the cause of dandruff?
11. How can a person catch dandruff?
12. Why is it important to keep the nails clean?
13. What was Benjamin Franklin's rule of success regarding cleanliness?
14. What advantage is there in taking cold baths?
15. What persons need to be careful in taking cold baths?

Suggestions and topics for development. Bring out the relations of health and cleanliness to success.

CHAPTER SIXTEEN

CLOTHING



FIGS. 57 and 58. American and Chinese women's shoes. Is either style sensible?

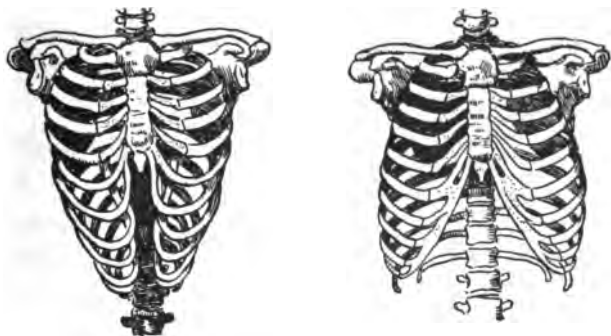
CLOTHING protects the body from injury and shields it from heat and cold and from sun and rain. Our personal appearance depends to a great extent upon the clothing that we wear, and it is right that we should try to have our clothing as neat and as becoming to us as is possible. We should not forget, however, that the real use of clothing is to protect the body; that if we wear clothes that are uncomfortable and unsuited to the weather merely because they are pretty, we are as foolish as we should be if we tried to live on peaches because they are more beautiful than bread and meat.

Clothing in cold weather. Clothing protects us from cold by keeping the heat of the body from passing off into the air. Only enough clothing should be worn to keep the body warm, because heavy clothing overheats the body and interferes with the breathing and the movement of the blood. Overcoats and wraps should be worn in cold weather, but they should be taken off at once when we come

indoors. If this is not done, the body will become too hot, the blood will come out into the skin, and the sweat glands will begin working. Then, on going out into the cold, the body is too suddenly cooled and there is danger of taking cold.

Wet clothing. Wet clothing takes the heat out of the body, and we should not allow the body to be chilled by letting clothing dry on it. Since cold and wet feet very commonly bring on colds, wet shoes and stockings should be changed for dry ones as quickly as possible.

Three habits that will be of great value in saving you from colds and other diseases of the air passages and lungs are wearing overshoes when your feet will become damp without them, carrying an umbrella when there is danger of rain, and wearing an overcoat or wrap when you need it.



FIGS. 59 and 60. The figure on the left shows how the ribs may be pressed in by tight clothing; the heart, lungs, and digestive organs are then cramped and injured. The figure on the right shows the natural position of the bones of the trunk.

Shoes and the feet. In a properly constructed shoe the weight rests directly upon the bones of the



FIGS. 61 and 62. What trouble will the shoe at the right cause?

arch of the foot — not upon the muscles that hold those bones together. Shoes like the one shown in Figure 57 do great harm, since the high heel throws the weight of the body upon the muscles that hold the bones of the arch in place.

During the Great War, many young men were found unfit for service because of flat feet. What was the matter with the feet of these rejected men? The muscles of the feet had become weakened from being cramped in tight or wrongly shaped shoes until they no longer held the bones of the arch and toes in proper position. Fallen arches press upon nerves that they should not press upon and so cause pain.

Changing clothing with the changes of the weather. The Chinese speak of the weather as one shirt weather, two shirt weather, three shirt weather, or four or five shirt weather, according as the weather is hot or cold. This means that on a hot day a Chinaman puts on one thin shirt and the cooler the weather the more shirts he puts on.

We can learn a great deal from the Chinese about

wearing clothing that is suited to the weather. An extra undershirt on cool days in the spring and fall and on very cold winter days would save many of us from colds or more serious sickness. Wearing cool, sensible clothing in the summer, instead of heavy woolen garments, would prevent much of the suffering and sickness and many of the prostrations that come from the heat.

A little baby should be thinly dressed on a hot day and warmly dressed in cold weather, and its clothing should have especial attention during changeable weather and on cool nights. Trying to harden children by having them go barefooted or with little clothing in cold weather is a mistake.

QUESTIONS

1. What are the uses of clothing?
2. When should overcoats and wraps be worn?
3. Why should they be removed when we are indoors?
4. Why is wet clothing injurious to the body?
5. Mention three habits that would help to save us from colds and other sickness.
6. Explain the following remark, "A soldier is as good as his feet."
7. How do the Chinese describe the weather?
8. What may we learn from the Chinese about properly clothing ourselves?

Suggestions and topics for development. Encourage the pupils to apply the ideas in this chapter.



FIG. 63. The muscles.

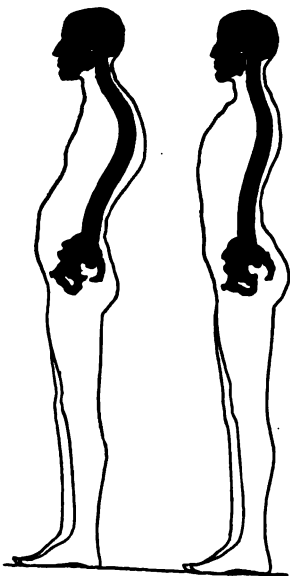
CHAPTER SEVENTEEN

THE CARRIAGE OF THE BODY

"STAND up and be a man!" A wise old teacher often said this to the boys of his school. It is good advice, for an erect carriage of the body does much to make and keep one strong. It gives the heart and the lungs room to do their work, and it allows the life-giving blood to flow freely through all the body. No one who stoops so that his lungs and heart are crowded together can be strong.

The skeleton. The skeleton forms the framework of the body. The backbone, or spinal column, runs up the back and carries the head on its top. From the spinal column the ribs and the shoulders are hung. The weight of all the upper part of the body falls on the spinal column, and if this part of the skeleton bends, the whole body will be stooped.

The muscles. The muscles are stretched on the framework of the body. *Their work is to move the body.* Lay your hand on your arm above the elbow



FIGS. 64 and 65. If the spinal column is allowed to droop, the body is stooped. If the spinal column is straightened out, the body is held erect.

and bend the arm. You feel a muscle drawing itself together to pull up your forearm. Put your hand to your cheek while you close your teeth, and you feel the movements of the muscle that closes the jaws. All over the body we have masses of strong muscles that slide smoothly and noiselessly over each other and move the different parts of the body.

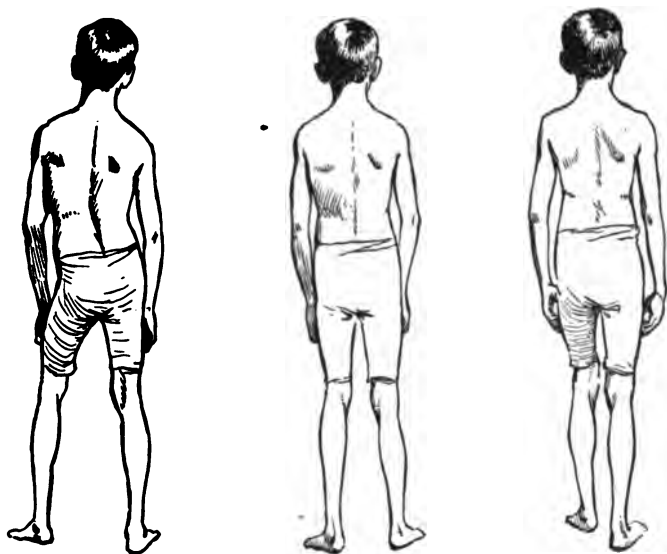
How the body is held erect by the muscles of the spinal column. The body is held erect by great muscles that lie along the back on each side of the spinal column. The spinal column is held up if

these muscles do their work properly, but if they are weak the spinal column bends forward, the head droops, and the ribs drop down and crowd the heart and lungs. No one can straighten himself by pushing his shoulders back, for the shoulders are supported by the spinal column just as the ears are supported by the head. *The body can be straightened only by tightening up the muscles along the back and straightening the spinal column.*



FIG. 66. Point out the muscles that support the spinal column.

How to secure a correct carriage of the body.
Stand and walk with the top of your head pushed



After Mosher

FIGS. 67, 68, and 69. Standing in the first position and throwing all the weight of the body on one leg twists the spinal column. Standing with the feet even, or with one foot slightly in advance of the other, keeps the spinal column straight.

up as high as possible. This straightens out the spinal column. Pull your chin in and push the back of your neck against your collar. Draw in your abdomen and do not allow your back to bend forward at the waist. Exercise helps to develop the muscles that hold up the body, but no amount of exercise can give one an erect carriage.

The importance of holding the body erect in youth. The bones of a little child are easily bent,



FIG. 70.



FIG. 71.

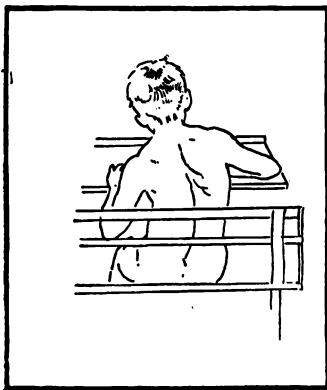


FIG. 72.

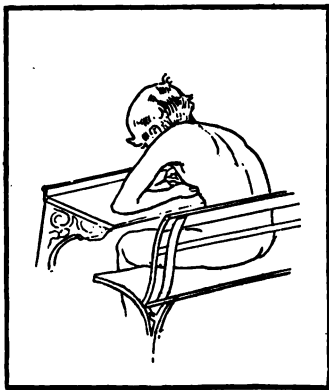


FIG. 73.

After Show

In Figure 70 the seat and desk are of such a height that the feet rest squarely on the floor, the body is held easily erect, and the shoulders are even. In Figure 71 the desk is too high and too far away from the seat. In Figure 72 the desk is too high, causing lateral curvature of the spine and uneven height of the shoulders. Figure 73 shows the bending over caused by too low a desk.

THE WALL - H. I.

and by beginning in the first place to
almost any other person who is
and it is not necessary to know
If you want to know a person's
cannot get in the way of
The growth rate of the
and it is not necessary to know
the most of the people who are
longer than the others.

100

1. How has it been working for you?
2. What is the biggest benefit to you?
3. What is the worst part of it?
4. How is the future for you?
5. What other things are you doing to improve your business?
6. What is the biggest challenge you are facing?

SUGGESTIONS FOR TITLES OF INVESTIGATIONS

flexibility exercises and stretching exercises are
methods of strengthening the muscles of the
spinal column and the muscles of the back.
each pupil has a set of exercises to do
footrests for the ankles and the feet
trace the curve of the spine
sitting in this position
standing and walking.

CHAPTER EIGHTEEN

EXERCISE



FIG. 74. Outdoor games furnish the best exercise because they bring into use all the muscles of the body, they take the mind off its tasks, and they keep us out in the fresh air.

EXERCISE makes the muscles strong, it quickens the flow of the blood, it improves the digestion, and it builds up the general health. Like food, it is good for us and ought to be taken every day. In fact, as we learned in Chapter Eight, we cannot digest our food properly unless we exercise our muscles; and nearly every one who fails to exercise has trouble with his stomach. Yet we can injure our bodies by taking too much or too violent exercise or by taking it at the wrong time. Hard work or play brings the blood into the muscles and the skin. The digestive organs then do not get as much blood as they ought to have while they are forming the digestive juices. For this reason we should not exercise hard just before eating, and we should rest awhile after each meal.

The open air the best place to exercise. The best place to exercise is in the open air. Then we get not only the benefits that come from the exercise but also the benefits that come from staying in the open air. In cities this is an especially important point, and many cities are now providing open-air playgrounds for the children of their crowded sections. If you live near such a playground, go to it as often as you can and take your little brothers and sisters with you, for outdoor play makes strong muscles, healthy lungs, rich blood, and an active brain. The many thousands of new school gardens which were planted during the war had as their main purpose the saving of food for the Allies. But the healthier and more robust human bodies which were developed by the outdoor work had a value far greater than the food produced.

Some rules in regard to exercise. *Exercise ought to be taken regularly.* A reasonable amount every day is far better than a large amount one day and none the next. *Proper exercise brings into use and builds up all the muscles.* It does not make giants of a few muscles and leave the others small and weak. Outdoor games are best of all for developing the whole body. *One should not allow himself to cool off too quickly after exercising,* as there is then danger of taking cold. Do not sit down without a coat or wrap when you are hot and tired, but walk about until you have become cool.



Keene's Manual of Physical Training, etc.

FIG. 75. Exercise of this kind should be taken in the open when it is possible to do so.

Over-exercising. In a former chapter (page 77) we spoke of the danger of injuring the heart by too violent and long-continued exercise. Such exercise is not good for any part of the body. Do not play tennis all day. Do not run after and kick a football all afternoon. Do not ride a bicycle too hard. Do not play baseball or exercise in a gymnasium until you are so tired that you will feel the effects the next morning. Be moderate and sensible in taking exercise as in everything else, and remember that you have gone too far if you become so exhausted that you cannot rest yourself in a short time.

Exercise in the schoolroom. After one has been sitting quietly at a desk for an hour or two, the breathing is shallow, the muscles are tired from remaining a long time in one position, the heart-

beat is slow, and the brain is beginning to tire. A person in this condition feels sleepy and dull, and he can learn little by sitting and looking at his book. If, however, he will stand up and spend a few minutes in stretching and breathing exercises, he will find himself feeling much better. The breathing will become deeper, the heart will beat more rapidly and with more force, and the tired muscles will be rested. The brain and the body are "waked up," and the person can go back to work, greatly freshened. Several times a day every one in a school-room should spend a little time in such exercises as are described in Chapter Twenty-seven. While this is being done, all the windows should be thrown wide open and the fresh outside air allowed to fill the room.

QUESTIONS

1. Why should one exercise?
2. What is the best place to take exercise?
3. Why should those who live in cities make use of the parks and open-air playgrounds?
4. Why is it unwise to exercise immediately before or after a meal?
5. Give three good rules in regard to exercise.
6. In what games or sports do the players sometimes hurt themselves by too much exercise?
7. What is the best way to rest after you have become tired of study?

Suggestions and topics for development. The exercise that pupils take during play hours. The wisdom of supplying school and municipal playgrounds. The school garden as a health agency.

CHAPTER NINETEEN

THE NERVOUS SYSTEM

IF an army had no officers, and each soldier marched as he pleased and camped where he pleased, we should not call it an army at all, but a mob ; and if the whole army attacked the enemy without plan or purpose, each man fighting in his own way, we should not expect it to win many victories. If an army is to overcome an enemy, it must have a general over it who will keep all its parts working together.

The human body is composed of many organs, and as all the parts of an army must be made to work together, so must all the organs of the body be made to work together. Over all the body, therefore, a ruler has been set to govern the organs and to make them do their work when it needs to be done. This ruler is the *nervous system*. It is made up of the *brain* and *spinal cord*, and of the *nerves*, which run out from the brain and spinal cord to all parts of the body.

The brain and the spinal cord. The center of the nervous system is the brain and the spinal cord. The brain is inclosed by the cranium or bones of the head. The spinal cord lies in a canal in the spinal column. The brain and the cord are very soft and delicate, and they are protected by the strong bones about them.

Nerves and their work. From the brain and spinal cord the nerves run out and branch until

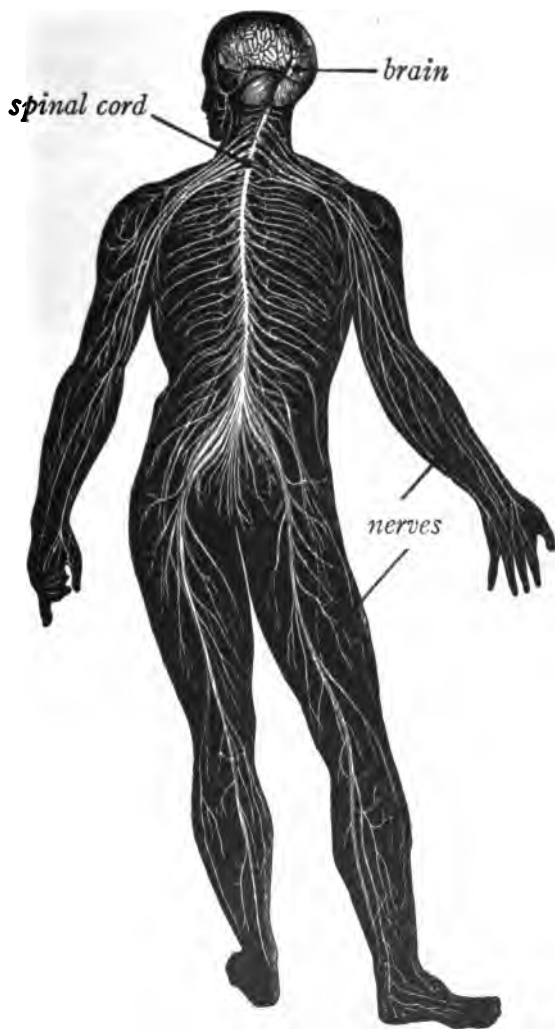


FIG. 76. The nervous system. From the brain and spinal cord nerves run to all parts of the body.



FIG. 77. The nervous system with the brain at its center may be compared to a telephone system with a chief operator in control.

they reach every muscle and the smallest parts of every organ. *The work of the nerves is to carry messages between the brain and the other parts of the body.* If you stick a pin into your finger, some of the thousands of nerves that end in the skin take a message to the brain. You then know that the finger was hurt. If you wish to lift your hand, your brain sends a message down the nerves to the muscles of your arm and causes them to move the hand. So whenever we hear, see, taste, smell, or feel, or whenever we move, we do so because the nerves carry messages either to or from the brain.

The work of the brain. The brain is the great center of the nervous system. It governs the heart and lungs. It gives us power to move when we wish to do so. It makes us able to see and to hear, to think and to feel, to know and to understand. Without the brain we should have no knowledge of where

our hands and feet are, we could feel neither heat nor cold, and we should always remain in one place as does a tree. The mind of man has made him the ruler of the world, but without the brain the mind would be gone. There would then be no joy or love or knowledge in us, and our whole existence would be like the existence of a stone.

QUESTIONS

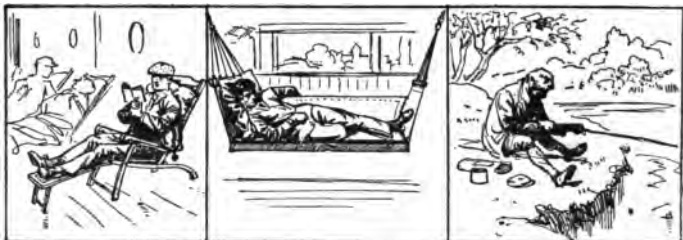
1. Why must the body have a ruler to govern it?
2. What is the ruler of the body called?
3. Name the chief parts of the nervous system.
4. Where is the brain?
5. Where is the spinal cord?
6. How are the brain and spinal cord protected?
7. What is the work of the nerves?
8. Explain what happens in the nerves when you stick a pin into your finger.
9. When you wish to move a part of the body.
10. Explain the work of the brain.
11. What would life be like without a brain?

Suggestions and topics for development. The chapter on Habit either in James' *Psychology for Teachers* or in James' *Talks to Teachers* (both published by Henry Holt and Company, New York) gives a vivid picture of the changes brought about in the nervous system by our activities. The primary function of the nervous system is to drive the muscles, and muscular exercise is most important in keeping the nervous system in health.

Make clear the fact that the brain is nourished in the same way as the other parts of the body, and that there is no such thing as a brain food.

CHAPTER TWENTY

THE CARE OF THE NERVOUS SYSTEM



FIGS. 78, 79, and 80. Rest and quiet recreation build up tired nervous systems.

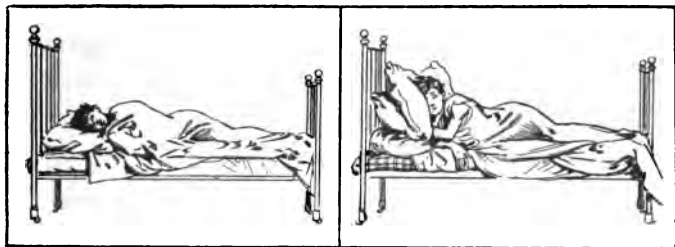
THE nervous system is the ruler of all the body, and if it is not kept in health the whole body must suffer. To keep it in health requires good food, pure air, exercise, freedom from germ diseases, — all the things that are needed by the rest of the body. In this chapter we shall discuss the need for rest and sleep, and the injury that comes to the nervous system from suffering pain.

The necessity for rest. No people have ever worked as the American people are now working. As a people, we hurry on from day to day, scarcely taking time to eat in a healthful manner. Even our play and our amusements are full of nervousness and excitement, and many of our people hardly know what an hour of quiet, peaceful rest is.

This kind of life is not healthful either for the body or for the mind, and while you are still in your youth you should form the habit of resting. When you become tired at your play, lie down and rest.

If you have a hard task and feel wearied after you have performed it, do not hurry off to play, but give your body the rest it needs. If you have a hard lesson, put your mind on it and study while you are at it; but if you find that your mind is tired and you are only looking at your book, stop and rest. Get up and open the window and take a breathing exercise, while you think of something new. Endeavor to keep yourself calm and quiet, avoid fits of anger or great excitement, and do not overdo at your play or at your work. Learn that peace and quietness are as much a part of a healthful, useful life as the bustle and excitement in which some people always live. Learn to rest, and you will have learned something that will do much toward keeping your nervous system in health.

The necessity for sleep. The nervous system needs something that the rest of the body does not require, and that is sleep. Without sleep we cannot remain in health. Young babies sleep nearly all



FIGS. 81 and 82.— A proper and an improper position for sleeping. Too high a pillow bends the spinal column to the side, interferes with the breathing, and disturbs the sleep.

the time, and the twelve- or fourteen-year-old boy or girl ought to have nine or ten hours of sleep every night. If you are sleepy at getting-up time, go to bed earlier.

Many people who have tried sleeping outdoors find that they need about an hour less sleep each night when they sleep in the open air than when they sleep indoors. The nervous system is built up and restored more quickly when we breathe pure air than when we breathe impure air. So move your bed out on an upper porch, or make sure that you have plenty of fresh air in your room at night. (Pages 58 to 60.)

Pain. The suffering of pain has a very bad effect on the nervous system. Ill health and disease bring on old age faster than the passing of the years, and one reason why sickness so often leaves the body weakened and aged is that the nervous system has been wrecked by the pain that it has borne. A week of toothache or of earache is a great drain on the nervous system. A corn that is continually causing pain can do as much to wear out your nervous system as an hour's extra work each day. Sometimes we learn to pay little attention to a dull pain and allow it to go on from week to week, but it is not right to do this. Pain is nature's danger signal; it is a call for help from some part of the body. Your nervous system can no more rest when these calls are coming to it night and day, than you could

rest with the screams of some one who is calling for help constantly coming to your ears.

Have you toothache? Have you earache? Have you headaches? Do your eyes pain you? Do your feet hurt you? Have you pain in any other part of the body?

If so, ask your parents to take you to a dentist or to a physician. For you ought to get up in the morning feeling fresh and rested; and you ought to go to bed, tired and sleepy, perhaps, but free from pain.



FIG. 83. You ought to wake up in the morning feeling fresh and rested.

QUESTIONS

1. Mention three points that are important in the care of the nervous system.
2. Does a person who works quietly and rests when he needs it do any less work than the person who is hurrying all the time?
3. How many hours of sleep ought you to have?
4. How may a person know if he is getting enough sleep?
5. What should be done by a person who continues to suffer pain?
6. Why?

Suggestions and topics for development. How a vacation may best be spent to fit one for another year's work.

CHAPTER TWENTY-ONE

THE IMPORTANCE OF HABIT



FIGS. 84, 85, and 86. Keeping the teeth clean, breathing pure air, and going to bed regularly at an early hour are three habits that have much to do with keeping us in health.

WHEN the nervous system has done a thing once, it does it the second time more easily. When one has performed an act a great number of times, one's nervous system becomes so trained that it carries out the act easily and quickly and often without thought. When the nervous system becomes trained in this way, we say that we have formed a habit.

Just what happens in the nervous system when a habit is formed no one knows. But we do know that in the movements of the muscles, in the training of the mind, and in the building of the character, nothing has so great an influence as the habits we have formed.

Habits and health. It is not single acts, but habits, that destroy the health. It is not single acts, but habits, that build up the health.

You will not become stooped by bending over a

desk one day, nor will you become straight by holding yourself erect some one time when you are walking down the street. Eating your dinner hurriedly one day and rushing back to school will not cause dyspepsia, nor will taking time to eat a few meals slowly cure it. The teeth decay, not because we leave them uncleaned for one day, but because we make a habit of leaving them uncleaned. The nervous system is injured, not by staying up late one evening, but by the habit of staying up late. The race for health is a long one, and it is not the short excited dash, but the patient plodding onward in the right course, that wins it. Habits and not acts are the important things in keeping the body in health.

Hygienic habits that you ought to form.

1. Keep your teeth clean.
2. Eat moderately and chew your food thoroughly.
3. Breathe pure air whenever it is possible to do so.
4. Go to bed regularly at a reasonable hour.
5. Take proper exercise and hold yourself erect.
6. Learn to rest and to keep yourself calm.
7. Clear the waste material out of the bowels at least once daily.
8. Guard yourself, so far as you can, from disease germs.

Form these eight habits and they will do more than all the medicines in the land to keep you in health.

Making hygienic habits a part of our lives. Our habits become a part of our way of living and doing things, and we do not think of them as matters that require extra work. If you will form the habits that we have mentioned above, you will soon wonder how any one can feel comfortable without them. You will pity the people whose teeth are decayed through lack of care. You will find yourself surprised that any one should want to make himself sick by eating too much or by swallowing his food without chewing it. You will think it strange that any one should live in a thick, stuffy atmosphere when there is pure air only the thickness of a window-pane away. You will almost pity the flabby-muscled people whom you meet. You will get out of patience with the person who potters around when he ought to go to bed ; and you will be amused when you see some one get excited over nothing and run around like an ant that has lost its way. You will guard yourself from disease germs without feeling that you are taking extra trouble ; and you will feel sorry for the poor persons all about you who needlessly suffer from germ diseases. Put into practice these health habits, and see if after a little while it is any special work for you to carry them out.

Mental habits. As we form habits of the body, so we form habits of the mind. And as it is the habits and not the single acts that are important to the body, so it is the habits that are important to the

mind. A boy does not fail in his class because he misses school one day, and he cannot pass his examinations with high marks by studying his lessons for one day. It is the steady work day by day that gives the training of the mind, the store of knowledge, and the habits of work that enable a pupil to pass from grade to grade in a satisfactory manner. Form the habit of studying and you will find that it is as easy to learn your lessons as it is to fail to learn them.

Youth the time when lasting habits are formed. Two or three days are enough to form or break a habit in a baby, but the older we become the harder it is for us to break old habits and to form new ones.

Just as the bones harden as we become older, with whatever shapes they had in youth, so the nervous system becomes set in its ways of doing things

as we advance in years. You should form habits that will carry you on in the road to health, and to respected, truthful, successful manhood and womanhood.



FIG. 87. When this hickory tree was young, a boy tied it in a knot. Now all the men in the world could not untie it. The habits that we form in youth are knots that we cannot untie in later years.



FIG. 88. Health and cheer go hand in hand. These boys have been on a farm, getting fresh air, good food, and plenty of exercise.

The habit of cheerfulness. Cheerfulness improves the digestion, quickens the blood, and gives tone and vigor to the whole body. Care and discontent have exactly the opposite effects. It is most important, therefore, that we form the habit of meeting the world with a brave heart; that we learn to appreciate the sunshine of life, and to dismiss vexa-

tious trifles and useless worry from our minds. The poet Browning gave us both a beautiful song and a splendid philosophy when he wrote:

“The year’s at the spring;
The day’s at the morn;
Morning’s at seven;
The hill-side’s dewpearled;
The lark’s on the wing;
The snail’s on the thorn;
God’s in His heaven —
All’s right with the world.”

QUESTIONS

1. What do we mean by a habit?
2. How are habits formed?
3. Is it as easy to form a good habit as a bad habit?
4. Name some habits that help to preserve the health.
5. How can one make these a part of his life?
6. How are mental habits formed?
7. Why should we form good habits in youth?
8. What is meant by the old saying, “As the twig is bent, so the tree is inclined”?

Suggestions and topics for development. Have the pupils observe habits that they have formed and experiment in forming desirable habits in little matters. Many cases of drooping carriage of the head are due to near-sightedness; and recently it has been stated that some children thrust their heads forward on account of annoyance caused by the rubbing of the clothing on the back of the neck, and that in these cases the faulty carriage can be corrected by cutting the garments low in the back. It is undoubtedly true that the conditions in which children live and work have much to do with the physical, mental, and moral habits that they form. The teacher should therefore see that, as far as possible, school conditions make easy the formation of correct habits.

CHAPTER TWENTY-TWO

THE EFFECTS OF ALCOHOL ON THE BODY

THE Eighteenth Amendment to the Constitution of the United States makes it unlawful to manufacture or sell intoxicating drinks. This amendment was ratified because the people had come to understand the evil effects of alcohol. It is well to keep these in mind.

Alcohol not a brain stimulant. It is a matter of common knowledge that alcohol in large quantities is a cause of delirium tremens, paralysis, and insanity, but many persons still believe that a glass of beer or wine stimulates the brain and increases the working power of the mind and body. This idea is a mistake. Typesetters who were given an ounce (two tablespoonfuls) of alcohol on certain days did nearly one tenth less work and made one fourth more mistakes than they did on days when they had no alcohol, and the effects of the alcohol lasted through the second day. A man who drank three ounces of alcohol each day for twelve days could add figures only three fifths as fast as when he drank no alcohol, while it took him more than three times as long to memorize a certain number of lines of poetry. Such facts show that the power to do mental work is lessened by alcohol, even when taken in small amounts. The effect lasts for at least forty-eight hours after a medium dose, and for this reason, the person who drinks alcohol daily is never able to do his full day's work. *Alcohol is not a brain stimulant.*

The resistance of the body to germs is weakened by alcohol. Persons who use alcohol are more easily attacked by germ diseases than are those who do not use alcohol, and the drinkers suffer more severely when they are attacked. Medical men are now convinced that the giving of alcohol to a patient who is suffering from pneumonia, diphtheria, cholera, typhoid fever, or other germ disease is not only useless but positively harmful. The ablest physicians threw their strength into the fight for prohibition because they believed that the use of alcohol is responsible for a great deal of tuberculosis.

Alcohol and length of life. The records of life insurance companies show that out of the same number of drinking men and total abstainers there are about fourteen deaths of drinking men for every ten among abstainers. A man at twenty years of age may expect to live 42.2 years if he does not use alcohol, but only 15 years if he drinks. Alcohol very considerably shortens the life of the user.

What employers think of the use of alcohol. Some years ago 6976 business men employing 1,745,823 men answered inquiries concerning their employment of drinking men. Of these, 5363 said they preferred men who were known to be abstainers, and 1613 said they made no effort to learn the habits of their men. Most of the great railroads strictly enforce rules against drinking while on duty, and many of them will not employ a drinking man. Every year

the number of positions open to the user of alcohol grows smaller.

Effects of the use of alcohol upon others. The drunkard is not the only person who suffers from the results of his habits. A vast number of persons live in need of food, clothing, and shelter because the money that should have supplied these things has been spent for drink. Almost one third of all persons who are supported by charity, and nearly one half of all homeless and friendless children in children's homes, owe their condition to some one's intemperance.

QUESTIONS

1. What are some of the effects of drunkenness on the nervous system?
2. What effects have small doses of alcohol on the power to do mental work?
3. How long does the effect of a single dose last?
4. How does the use of alcohol affect the resistance of the body to germ diseases?
5. How does the use of alcohol affect length of life?
6. What do employers think of the use of alcohol?
7. How does it affect others than the drunkard?

Suggestions and topics for development. Inquire of the children as to what they know of the attitude of life insurance companies toward moderate drinkers.

Dr. Henry Smith Williams in *Alcohol: How It Affects the Individual, the Community, and the Race* (McClure, Phillips & Company, New York) gives an accurate summary of what is scientifically known of the effects of the use of alcohol.

CHAPTER TWENTY-THREE

THE EFFECTS OF TOBACCO ON THE BODY

If men could see the effects of tobacco as plainly as they can see the effects of liquor, fewer of them would use it to their injury. This is what is meant by the statement, "Less harm would be done by tobacco if it were more harmful." The harm that tobacco does is not felt in a day or a month, and many tobacco users are unable to see that the habit is injuring them. Many other persons feel



"The Sprinter," by Dr. R. Tait McKenzie

FIG. 89. The athlete knows that alcohol and tobacco are foes to speed, strength, and nervous control.

that they would be better off without tobacco, but have the habit of using it so firmly fixed that they are unable to break it. While the use of tobacco affects the whole body, we shall study only its effects upon the heart, the digestion, and the nervous system.

The effect of tobacco upon the heart. Tobacco contains a poison called nicotine, which is highly injurious to the heart. In those who use tobacco to excess, the heart beats more rapidly than it should, while the force of its beat is greatly lessened.

The effect of tobacco upon the digestive organs.

The worst effects of tobacco upon digestion are due to the fact that the heart is weakened and the digestive organs do not get a sufficient supply of blood. The digestive juices are lessened in amount, so that the food cannot be promptly digested. This trouble comes on slowly, and often is not noticed by the person himself. Even when it becomes serious, the tobacco user often believes that his indigestion is due to some other cause. When such a person gives up the tobacco habit, he is usually surprised to find that there is great improvement in his powers of digestion and in his general health.

The effect of tobacco upon the nervous system.

When used in moderate amounts, tobacco soothes and quiets an excited or worried person, enabling him to go on with his work for a time. But often one who has his mind cleared of worry in this way forgets the importance of the work he has to do, and idles away his time instead of going earnestly to work to finish his task. When used in larger amounts tobacco makes the whole nervous system more irritable.

Tobacco and scholarship. The worst effects of tobacco upon the nervous system are its effects upon the mind. Wherever smokers and non-smokers have been compared, it has been found that non-smokers are much better students. They not only prepare their lessons more easily and more quickly, but

they retain what they have learned longer than the smokers. Of 2336 smokers in the public schools of one city, only 320 were able to keep up with their classes, while only 16 were reported as "bright" or "better than average" students.

Tobacco a nuisance. Even if the use of tobacco were harmless, it would still be a nuisance to other people. Yellow fingers and stained teeth are unpleasant sights, and many people are made sick by the odor of tobacco smoke. No one has a right to do that which makes his neighbors uncomfortable. No one has a right to do that which will injure his own body. Tobacco is both harmful to the user and annoying to others, and the only sensible and right thing to do is to avoid its use.

QUESTIONS

1. Why do not more people realize the harmful effects of tobacco?
2. Why do those who know that tobacco is injuring them continue its use?
3. What are the effects of tobacco upon the heart?
4. In what way does tobacco interfere with digestion?
5. What effect have small amounts of tobacco on the nervous system?
6. Large amounts?
7. How does its use affect scholarship?
8. Give two final arguments against the use of tobacco.

Suggestions and topics for development. The economic side of the tobacco question. The effect of tobacco on the growth and development of the body.

CHAPTER TWENTY-FOUR

THE EYES AND THEIR CARE



FIGS. 90 and 91. In writing, the light should come from the left side, and the seat and desk should be the proper height to make it easy to keep the body and head erect and the shoulders even. In reading, the light should come from the side so that it will shine on the book and not into the eyes.

WE look at the sky at night and see it studded with stars. Sometimes we see the round moon like a great quiet mother among the twinkling stars. We look at a rose and we see its beauty and the richness of its color. We know its size and the shape of its leaves.

What is it that comes from the stars and the rose to the eye? It is light. What does the light do in the eye that causes us to see? It starts messages in the nerves of the eye, and these messages are carried to the brain. What do we learn from these messages? We learn from them the greater part of all that we know of the world about us. To get an idea of the importance of the eyes and of the mes-

sages that come from them, think how helpless you would be if you had no eyes to guide you ; how little you would know if you should forget all that you have learned through their use ; how much pleasure you get from seeing the world about you, and how dreadful it would seem to pass your life in the darkness of a long unlighted night.

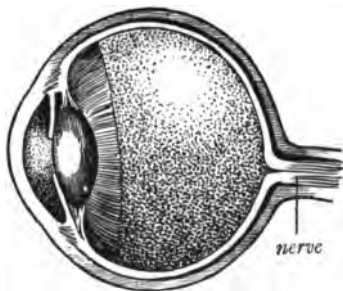


FIG. 92. The light passes back into the eye and starts messages in the nerve to the brain.

How the eyes are protected. The eyes are protected by the eyelids, eyelashes, and eyebrows. They are bathed and washed free from dust by the tears. These are secreted by a gland in the outer part of the upper eyelid and drain into the nose through a little duct from the inside corner of the eye.

How the eyes are moved about. Each eye is moved about by six little muscles, which can turn the eye toward the object that we wish to see. A person who squints or is cross-eyed has some of his eye muscles shorter than others. A skillful physician can remedy this trouble if it is taken in time.

Near-sighted and far-sighted persons. Images or pictures of the things that we see are formed in the back of the eye, just as an image is formed in the camera of a photographer. It is these images

that start the messages along the nerves from the eye to the brain. From these messages we can tell the size, form, and color of objects. We can tell many other things about them, such as whether they are rough or smooth and how far away they are. In the eyes of a near-sighted person the images of near-by objects are clear and distinct, but the images of distant objects are blurred and indistinct. In far-sighted persons the images of distant objects are clear, but it is a great strain on the eyes to see near-by objects clearly. In some eyes the images are always confused, and it is not possible for the person to see objects at any distance clearly. All these troubles can be corrected and the images made distinct by wearing spectacles that are properly fitted to the eyes. A person who holds his book less than twelve inches from his eyes when he is reading is near-sighted and needs glasses.

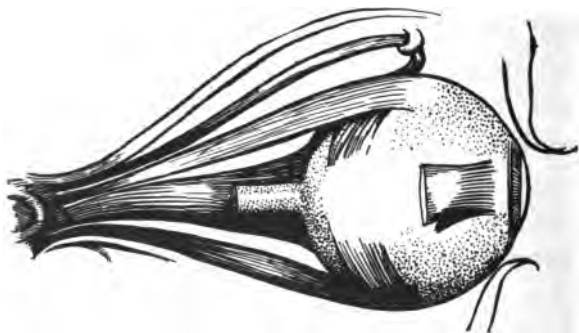


FIG. 93. The muscles that move the eye. When you read with a book very close to your eyes, as you do when you bend forward over your desk and rest your chin on the book you are reading, you put a great strain on the muscles that turn the eyes inward.

The importance of fitting the eyes with spectacles?

If the images that are formed in the eyes are not clear and distinct, the eyes will always give trouble. Near-sighted and far-sighted persons, and others who do not see clearly, should, therefore, have spectacles at once. Many cases of nervousness disappear as if by magic when the eyes are fitted with glasses. Many persons who are wretched from indigestion find out that the trouble is in their eyes and not in their stomachs, and that their health is completely restored by wearing glasses. Thousands of people are suffering from blinding headaches, when all that is needed to save them from this pain is properly fitted spectacles.

Eye trouble very common among school children.

Of 432,000 school children who were examined in Massachusetts, more than one in five had defective vision. In the United States it is estimated that there are 5,000,000 school children who ought to be wearing glasses.

Do you hold a book close to your eyes when you are reading? Are you falling behind in your school work because you cannot see what is written on the blackboard? Do your eyes smart and ache after you have been studying for some time? Are they red and inflamed? Do you have headache or stomach trouble? If so, try to have your eyes examined and to get glasses if you need them. It is a mistake to think that going without glasses will help a person to

outgrow eye trouble, for the trouble will become worse. Have your eyes tested and glasses fitted by a good oculist, not by a traveling optician. Many traveling opticians know very little about eye troubles or the proper selection of glasses to correct them.

The importance of good light for work. The eyes are often injured by working in a poor light. It is a bad plan to try to read between sundown and dark, as one may not notice that darkness is coming on and may strain the eyes without knowing it. Persons often carelessly seat themselves too far from the lamp when they read. Dark school-rooms are injuring the eyes of thousands of children. A bright light shining into the eyes is even worse than too dim a light, and one should not face a window or a lamp when reading or studying. Light from the left side is best for writing, for then the shadow of the hand does not interfere with the work. A flickering gas light should not be used for reading. A book printed on shiny, glazed paper is hard on the eyes.

Resting the eyes. Using the eyes in close work, such as reading, embroidering, or sewing, causes the eyes to become tired. When doing such work it is a good plan to close the eyes for a few minutes occasionally or to look out of a window in order to rest the eye muscles; or one may rest the whole body as well as the eyes by standing up and going

through one of the exercises described in Chapter Twenty-seven. Reading while lying down, walking, or riding in a street car or train quickly tires the eyes, and if it must be done should be kept up for only a very short time. Serious eye troubles are apt to follow measles and scarlet fever, and the eyes should be shielded from bright light and rest d during these diseases and during recovery from them.

Catching diseases of the eye. There are a number of catching diseases of the eye (often called "pinkeye" or some similar name) that are caused by germs. The germs are carried from one person to another on towels, on the hands, by flies, and in other ways. These diseases often leave the eyes weak and inflamed for life, and you should make every effort to avoid the germs that cause them.

Do not wash your eyes in a public wash basin or wipe them on a public towel. Do not rub them or pick the lashes with your fingers. Boracic acid dissolved in water¹ and dropped into the eyes once or twice a day will often help to kill bacteria and relieve the smarting and burning that comes from red and inflamed eyes. Nothing else should be put



FIG. 94. Germs often get into the eyes from the fingers.

¹ The solution is not too strong as long as all of the boracic acid is dissolved.



FIG. 95. An inspector examining the eyes of a pupil.

into the eyes without the advice of a physician. One should never experiment with his eyes by using eye washes or salves about which he knows nothing.

Foreign bodies in the eye. When a particle of dust or some other foreign body gets into the eye, *the eye should not be rubbed*. Sometimes the body can be washed out with clean water; or if the upper eye-lashes are taken between

the finger and the thumb and the eyelid drawn down and out, the position of the body may be changed until it can easily be removed. Some persons are skillful enough to turn the eyelid wrong side out and wipe the particle off with a cloth or a tuft of cotton. When this is done, the fingers, the cloth, and everything that touches the eye should be absolutely clean, for it is an easy matter to get into the eye germs that will cause great trouble. Sharp pieces of metal or stone ought to be removed by a physician or an oculist before they cut deep into the eye and cause inflammation.

QUESTIONS

1. How does the light that enters our eyes cause us to see?
2. How are the eyes protected?
3. How are they cleansed?
4. Where do the tears come from?
5. Where do they go after they leave the eye?
6. How are the eyes moved?
7. Of what advantage is this to us?
8. What makes a person cross-eyed?
9. What is the trouble with the images in the eyes of a near-sighted person?
10. How may these difficulties be remedied?
11. Why should this be done?
12. What are some of the symptoms of eye trouble?
13. Explain what kind of light is needed in reading and studying, and how the light should fall on the page.
14. How may the eyes be rested?
15. How do germs that cause diseases of the eye spread from one person to another?
16. Tell how to remove a foreign body from the eye.

Suggestions and topics for development. The teacher should test the eyes of the pupils in the room. If no test card is provided by the school, one can be obtained by sending ten cents in stamps to World Book Company, Yonkers-on-Hudson, New York.

Some children will be found who cannot read the writing on the blackboard from the back of the room. These children should be placed on the front seats, and the parents should be prevailed on to provide the needed glasses as soon as possible.

The teacher should also look to the proper lighting of the school-room, paying special attention to whether parts of it are too dark and whether the children are seated facing the light.

CHAPTER TWENTY-FIVE

THE EARS AND THEIR CARE

WHEN you throw a stone into water, the stone causes waves to run out into the water. When you ring a bell, the bell causes waves to run out in the air. When you shout, when a whistle blows, or when a bird sings, waves are made to run through the air. When these waves strike the ear, you hear the bell, the shouting, the whistle, or the singing of the bird. If the air waves are large, the sound will be loud. If the air waves are small, the sound will be faint in your ears.

The function of the ear. The ear collects the sound waves and makes them strike on the ends of the nerves of hearing. This causes the nerves of hearing to carry messages to the brain, and when these messages arrive in the brain we hear the sound. Certainly nothing in the world is more wonderful than the human ear, for it changes the air waves that come from the strings of a violin or piano into the sweetest music, and by collecting the waves that are caused by the voices of our friends, it brings to us the thoughts that they wish to express to us.

The structure of the ear. The ear has three divisions: the outer, the middle, and the inner ear. The outer ear is made up of the part that we see and a canal that runs down into the head. At the bottom of this canal is a thin, delicate membrane called the *tympanic membrane*. This separates the outer and the middle ear.

The middle ear is a little cavity in the bone of the skull. It is filled with air, and from it a little tube

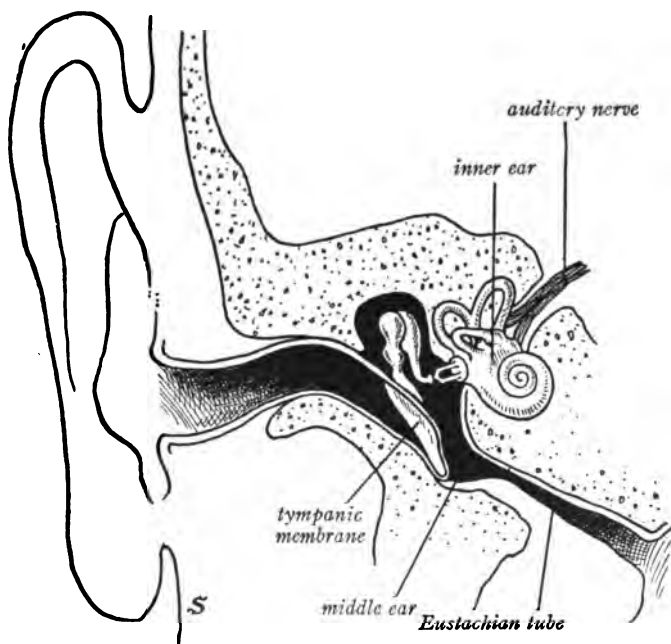


FIG. 96. The ear. The ear is composed of an outer, a middle, and an inner part.

runs to the throat. In the middle ear are three small bones which stretch across from the tympanic membrane to the inner ear. The inner ear is filled with liquid, and in this liquid lie the endings of the nerve of hearing.

How we hear a sound. The outer ear collects the sound waves and turns them down the canal to

strike against the tympanic membrane. This sets the tympanic membrane to swinging, and the mem-



Signal Corps, U. S. A.

FIG. 97. A musician of the American Expeditionary Forces. Life would lose much of its interest if we could not hear.

brane puts the chain of little bones in motion. The motion of the bones disturbs the liquid in the inner ear and causes waves in it. These waves wash over the ends of the nerve of hearing and start messages to the brain, and when these messages reach the brain we hear the sound.

The care of the ear. Practically all the serious troubles of the ear come from germs that work up the tube from the throat into the middle ear. In Figure 39 you can see that the openings of these tubes are high up in the throat, where the matter that falls into the throat from the nose in cases of catarrh passes over them and where they may be pressed upon and closed by adenoid growths (compare Figure 46). Most children who are hard of hearing have nose or throat trouble, and most older persons who are deaf suffered from these troubles when they were young.

The danger from running ears. A running ear means that there are germs in the ear that are causing

inflammation and forming the same kind of matter that comes from boils and sores. This trouble ought by all means to be attended to at once, for in a running ear there is already a hole in the tympanic membrane, and there is danger that this membrane will be destroyed or that the chain of bones will be broken down and incurable deafness caused. There is always the danger also that the germs will work through to the brain, which lies close above the ear, and cause the disease that is called meningitis.

A running ear ought to be treated with medicines that will kill the germs in it, and this ought to be done by a physician. A child with a running ear ought also to be examined and treated for the nose or throat trouble that in most cases has caused the ear to become infected. Plugs of cotton should not be worn in the ear, for they do damage; the ears ought to be cured so that the cotton will not be needed. An earache may sometimes be kept from coming on at night by wearing a cap over the ear or by sleeping on a hot-water bottle, and a doctor can usually give something that will stop the pain for the time.

Do you suffer from earache? Have you a running ear? Are you hard of hearing and falling behind in your school work because you cannot hear what is said in the schoolroom? If so, try to have your ears examined and treated. Do not let any one tell you that you will probably outgrow your trouble,



FIG. 98. Testing a boy's hearing by trying how far he can hear the ticking of a watch.

for most people who are hard of hearing today are in that condition because they were neglected in childhood, and without treatment you are likely to grow into a life of deafness. A physician who understands the treatment of ear troubles will not tell you to wait and let them pass away of themselves.

Foreign bodies in the ear. If a live insect gets into the ear, it can be drowned and the buzzing stopped by pouring water or oil into the ear. Only a physician should try to take anything out of the ear, for there is always danger that an unskilled person will drive the object through the tympanic membrane. Sometimes the yellow wax which is formed in the canal blocks it up and interferes with the hearing. If it cannot be washed out with jets of warm water from a small, soft rubber syringe such as any drug store can supply, it should be removed by a physician.

QUESTIONS

1. How is sound caused?
2. Why are some sounds loud and others faint?
3. What is the function of the ear?
4. Name the divisions of the ear.
5. What is in the middle ear?
6. How is it connected with the throat?
7. What is found in the inner ear?
8. Explain what happens in the ear when we hear a sound.
9. How do germs get into the ear?
10. Why are persons who have catarrh or adenoids especially liable to diseases of the ear?
11. What is the cause of running ears?
12. Why should running ears never be neglected?
13. What should be done when an insect gets into the ear?
14. Why is it dangerous for any one but a physician to try to remove bodies from the ear?

Suggestions and topics for development. The function of the Eustachian tube. Why a cold sometimes causes deafness. The teacher should test the hearing of the children in the room. Some who are hard of hearing will always be found, and these ought to be seated at the front of the room. A fairly accurate test of hearing can be made with a watch. Watches differ in the loudness of the tick, and a considerable number of ears should be tested with the same watch to find how far it ought to be heard. In making the test a quiet room is necessary and the watch should always be held in the same way. To make a test of hearing have the child blindfolded, and let him cover one ear with his hand. Then at different distances try if he can hear the ticking of the watch. Both ears should be tested, and any child who seems hard of hearing should be examined by a physician who understands ear troubles. It is stated that two thirds of all deafness is caused by adenoids. For this reason thoroughly impress the importance of prompt attention to adenoids or to any persistent inflammation of the nose or throat.

CHAPTER TWENTY-SIX

ACCIDENTS

IN case of accident in the country, and sometimes even in the city, it is not always possible to secure a physician until considerable time has passed. Every one should therefore understand what is best to be done in some of the more common accidents. When one is called on to use this knowledge, he should above all else try to keep a cool head and to act promptly, for often a great deal depends on doing something for the patient at once.

Broken bones. If a broken arm or leg is allowed to be bent or doubled, there is danger that the ragged ends of the bones will cut and wound the muscles, blood vessels, and nerves. Keep the limb straightened out until a physician arrives.

Burning clothing. If your own clothing takes fire, *do not start to run*. Lie down and wrap yourself in a rug, blanket, or coat, or roll over and over to put out the flame. Do not stand up so that the flame will come up about your face, for the great danger comes from breathing in the flame. If another person's clothing takes fire, wrap a rug or blanket about him, and throw him down. Protect



FIG. 99. Proper method of bandaging a broken finger.



FIGS. 100 and 101. In cases of apparent drowning, the body must first be raised in order to get the water out of the lungs. Then as quickly as possible get the air to passing into and out of the lungs, using the method shown in the right-hand figure.

your face as much as possible while doing this, and if you must pass through a burning building close to flame, hold something before your face. Until a physician arrives, burns may be protected from the air with cloths spread with vaseline or cotton-seed oil or dipped in water that contains baking soda.

Fainting. Lay the patient flat on his back so that the blood will flow easily to the head. Cold water sprinkled on the face or ammonia held under the nose will help to restore consciousness. Fifteen drops of ammonia given in a third of a glass of water or a cup of strong coffee will help revive the patient.

Apparent drowning. Drain the water from the patient's lungs by holding him for a few seconds as shown in Figure 100. Then quickly lay him in the position shown in Figure 101, with a folded blanket or coat under his chest. Place your hands on either side of the back over the lower ribs. Throw

the weight of your body steadily downward on the hands and drive the air out of the lungs. Take the pressure off the body without lifting the hands and allow the air to come into the lungs. Repeat about fifteen times a minute. Keep the patient as warm as possible. The artificial breathing should be kept up for an hour or more if the patient does not revive sooner.

Ivy poisoning. The poison in poison ivy is an oil, and it may be dissolved and removed from the skin by a vigorous scrubbing with a brush and hot soap-suds. Laundry soap is best for this purpose, because it contains more of the alkali which removes the oil. In case the oil has penetrated the skin and a burning sensation is felt, the affected parts should be first scrubbed with soap and then bathed in a mixture of equal parts of alcohol and water. The alcohol dissolves the oil and it should be used freely or it may

only serve to spread the poison over a larger surface. If further treatment is needed, bathing with a hot solution of potassium permanganate is very helpful. In case the skin is at all broken, a one per cent solution (a scant level teaspoon-

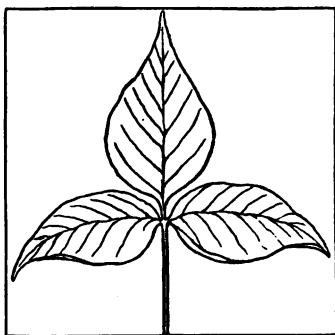


FIG. 102. Poison ivy.

ful of crystals to a pint of water) should be used, but if the skin is unbroken a stronger solution is advisable. Potassium permanganate is a poison and should not be used more than a few times without consulting a physician. It will stain the skin, but the stain is not permanent.

Poisoning. Bottles that contain poisons should not be kept among medicines, and it is well to paste on these bottles strips of sandpaper, so that they can be recognized even in the dark. When a poison has been taken by accident, a physician should be called as quickly as possible. In the meantime the following remedies may be used:

Carbolic acid. Give large quantities of milk, or olive, linseed, or cotton-seed oil.

Bichlorid of mercury (also called mercuric chlorid and corrosive sublimate). Give milk or white of egg. Cause vomiting by giving a tablespoonful of mustard in a glass of warm water, warm salt water, or large quantities of hot water. Tickle the throat with a feather or thrust the finger into the throat to bring on the vomiting.

Arsenic. Cause vomiting, and if any medicine that contains iron is at hand, give it. The poison in Fowler's solution, Paris green, and Rough-on-Rats is arsenic.

Opium, laudanum, nightshade, and Jimson weed poisoning. Give large quantities of strong coffee or of ammonia diluted until the patient can drink it.

Keep the patient awake by walking him about, slapping him, or throwing cold water over him if necessary. Cause vomiting.

QUESTIONS

1. What danger must be guarded against when a bone of one of the limbs is broken?
2. Tell what should be done in case the clothing takes fire.
3. In case of fainting.
4. How should a person suffering from apparent drowning or gas suffocation be treated?
5. What should be done in case of poisoning with the more common poisons?

Suggestions and topics for development. Show the class how to carry on artificial respiration. Write to the Director of the Agricultural Experiment Station of your state for a bulletin on poisonous plants; teach the children to know and to avoid the poisonous plants of the region.

CHAPTER TWENTY-SEVEN

SOME SIMPLE EXERCISES FOR USE IN SCHOOLS

IN this chapter are some simple exercises that may be given in school when the pupils have become tired of study and their muscles are cramped from sitting for some time in their seats. The teacher should select exercises so that each day the muscles of the whole body will be brought into play, and the school should be trained to go through them in a quiet, orderly manner, so that little time will be lost from the lessons. The windows should be thrown wide open before the exercises are begun. In warm weather some teachers may prefer to give the exercises outdoors.

Position while exercising. The most important point is to hold the body erect. The head should be stretched up as high as possible, as though the body were hanging by the back of the top of the head. This will straighten out the spinal column; hold the neck straight, with the chin close to the neck, and lift the ribs up off the lungs (see Figure 65).

In the following exercises, whenever the command "*Position!*" (Fig. 103) is given, it means that the head is to be held in this way, with the hands at the sides. The position for resting is to stand with the feet even and wide apart, and the arms crossed behind the back and resting on the backs of the hips.¹ The trunk and head should

¹ If preferred, the position shown in Figure 69 may be used in resting.



FIG. 103.

be held erect but not rigid while resting. The command "*In place!*" means to take this position, and the command "*Rest!*" means to remain in the resting position until the next command is given. The command "*In place, rest!*" should be given after each exercise.

Commands. There are always two parts in the commands; one part tells *what to do*, and the other part tells *when to do it*. In the commands for these exercises the parts which tell when to do a thing are printed in black letters. For example, the command, "Hands on hips, **place**," means to place your hands on your hips when the teacher says "**Place!**"¹

A. Breathing exercises.

EXERCISE 1. Breathing exercise, hands at sides. In all breathing exercises stand tall (page 97).

Inhale and exhale slowly and steadily through the nostrils. Keep the head and body erect as the air is exhaled. At the command **inhale**, take in a full breath, and hold until the command **exhale**.

Command: *Position*.

Breathing exercise with hands at sides, inhale — exhale (repeat four times).

In place, rest.

EXERCISE 2. Breathing exercise, hands on ribs.

¹ In some of the exercises the complete commands and counting have not been given. The teacher will easily understand what these should be and will give them.

Place the hands over the lower ribs, and as the air is exhaled, press on the ribs with the hands.

Command: *Position, hands on ribs, place.*

Breathing exercise, hands on ribs, inhale — exhale (repeat four times).

In place, rest.

EXERCISE 3. Breathing exercise, arms raised through front horizontals high over the head. As the air is inhaled, slowly raise the arms as in Exercise 7, and let them come down again slowly as the air is exhaled. Keep the arms and fingers stretched out straight and stiff.

Command: *Position.*

Breathing exercise, arms raised through front horizontals to high over the head, inhale — exhale (repeat four times).

In place, rest.

EXERCISE 4. Breathing exercise, arms raised through side horizontals to high over the head. Position and movement of arms as in Exercise 9. Raise the arms as the air is inhaled and lower them as the air is exhaled. *Head, arms, and fingers stretched up.*

Command: *Position.*

Breathing exercise, arms raised through side horizontals to high over the head, inhale — exhale (repeat four times).

In place, rest.

EXERCISE 5. Breathing exercise, arms raised through front horizontals and lowered through side horizontals. The same as Exercise 3, but move the arms as in Exercise 9.

EXERCISE 6. Breathing exercise, arms raised through front horizontals high over the head, rising on toes. The same as Exercise 3, but rise on the toes as the air is inhaled and slowly bring the heels down as the air is exhaled.

B. Arm raisings.

EXERCISE 7. Arm raisings through front horizontals to high over the head (Figure 104).



FIG. 104.

Raise the arms high over the head, knuckles leading (*i.e.* the backs of the hands going before the palms), through a front horizontal position. Keep the arms and fingers stretched out stiff and straight. The teacher should count 1 as the arms are raised, and 2 as they are lowered. Keep the head stretched up.

Command: *Position.*

Arm raisings through front horizontals to high over the head, up — down.

(Teacher counts:)

1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2.¹

In place, rest.

¹ If preferred, the teacher may count 1, 2, 3, 4, 5, 6, 7, 8.

EXERCISE 8. Arm raisings through front horizontals to high over the head, rising on the toes.

The same as Exercise 7, but rise on the toes as the arms are raised and bring the heels down as the arms descend.

Command: *Position.*

Arm raisings through front horizontals to high over the head, rising on toes, up — down.

1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2.

In place, rest.

EXERCISE 9. Arm raisings through side horizontals to high over the head (Figure 105). Directions as for Exercise 7, but raise the arms through a side horizontal position, bringing them up over the head with the palms forward, thumbs touching. Do not bend the arms at the elbows.



FIG. 105.

Command: *Position.*

Arm raisings through side horizontals to high over the head, up — down.

1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2.

In place, rest.

EXERCISE 10. Arm raisings through front horizontals, descending through side horizontals.

Raise the arms as in Exercise 7, and bring them down as in Exercise 9. Vary the exercise by sometimes rising on the toes.

Command: *Position.*

Arm raisings through front horizontals, descending through side horizontals, up — down.

1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2.

In place, rest.

These arm exercises can be varied by having the pupils go through them with either the right or left arm, with both arms, or with the right and left arms alternately.

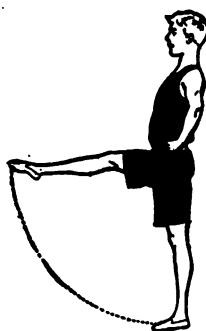


FIG. 106.

C. Leg exercises.

I. *Leg raisings.*

EXERCISE 11. Leg raising to front horizontal (Figure 106).

The leg should be brought forward and upward, with the toe pointed down to bring the foot as nearly as possible in a straight line with the leg. Do not bend the leg at the knee. Head and trunk erect; *i.e.* "stand tall."

Command: *Position, hands on hips, place.*

Leg raising to front horizontal, right leg, up — down.

1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2; 1, 2.

*Left leg, up.*¹

¹This command should be given instead of the last three counts while the right leg is being raised. The exercise will not then be stopped while the command is being given.

1, 2 ; (repeat eight times).

In place, rest.

EXERCISE 12. Leg raising to side horizontal.

Count and position of leg and foot as in Exercise 11, but raise the leg to the side. Do not let the body lean over to the side.

Command : *Position, hands on hips, place.*

Leg raising to side horizontal, up — down.

EXERCISE 13. Leg raising to back horizontal.

Count and position of leg and foot as in Exercise 11, but raise leg to the back.

Command : *Position, hands on hips, place.*

Leg raising to back horizontal, up — down.

II. *Leg flexions (bendings).*

EXERCISE 14. Leg flexion forward (Figure 107). Position of toe as in Exercise 11. Leg from knee down should be *vertical*. Raise knee toward chin as far as possible, keeping the body and head erect.

Command : *Position.*

Hands on hips, place.

Leg flexion forward, right leg, up — down.

1, 2 ; (repeat eight times).

Left leg, up — down.

1, 2 ; (repeat eight times).

In place, rest.



FIG. 107.

EXERCISE 15. Leg flexion backward.

Count and position of foot as in Exercise 11. Bend

the leg backward at the knee. Raise the foot as high as possible, *keeping the knees close together and even.*

Command: *Position.*

Hands on hips, place.

Leg flexion backward, right leg, up — down.

III. Squat.

EXERCISE 16. Half squat, with arms extended to front or side horizontals (Figure 108).

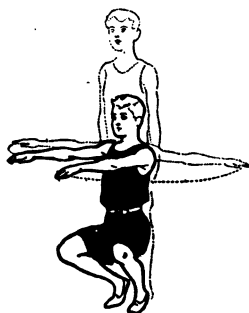


FIG. 108.

Lower the body, raising the heels, bending only at the knees and hips. The knees should be turned out so that they will be in a straight line with the toes. As the body descends, raise the arms to front horizontal (extended straight out in front, palms down), or to side horizontal (extended out at sides);

now lower the arms to the sides as legs are straightened. *Head and trunk erect.*

Command: *Position.*

Half squat, with arms front (or side) horizontals, squat.

1 (lower body and raise arms), 2 (lower arms and raise body); (repeat eight times).

In place, rest.

D. Body flexions.

EXERCISE 17. Trunk forward flexion (Figure 109). Place the hands on the hips, and bend the body for-

ward. Keep the legs straight at the knees and the head in a straight line with the trunk, the body bending only at the hips.

The count for body movements should be slower than for limb movements.

Command: *Position.*

Hands on hips, place.

Trunk forward, bend, upward, raise.

1, 2; (repeat four times).

In place, rest.



FIG. 109.

EXERCISE 18. Trunk sidewise flexion. Position as for Exercise 17. Do not let the head bend over toward the shoulders.

Bend alternately to the right and to the left.

Command: *Position.*

Hands on hips, place.

Trunk sidewise, bend, upward, raise.

1, 2; (repeat four times).

In place, rest.

EXERCISE 19. Trunk backward flexion.

Position and directions as for Exercise 17. Bend the body backward. Do not let the legs bend at the knees.

Command: *Position.*

Hands on hips, place.

Trunk backward, bend, upward, stretch.

1, 2; (repeat four times).

In place, rest.

EXERCISE 20. Alternate trunk flexions. Bend forward, then to the right, then to the left, and then backward.

Command: *Position.*

Hands on hips, place.

Alternate trunk bendings, bend.

1, 2; (bend each way and repeat once).

In place, rest.

The exercises in bending may be varied by clasping the hands together and placing them on top of the head instead of on the hips.

Suggestions and topics for development. The teacher should understand that the new concept of education has as its goal a realization of the old ideal of a sound mind in a sound body, and that the school and the teacher are now expected to accept the responsibility for the physical welfare and development of the child as definitely as they accept the responsibility for his mental training. Time taken for school exercises, for securing proper schoolroom conditions for work, and for following up the hygienic habits and administering to the hygienic needs of the pupils, is spent in school work as truly as is the time devoted to reading and arithmetic, and it is as important that the teacher become expert in training the pupils in right physical living as it is for her to understand the best methods of imparting information and of developing the mental powers.

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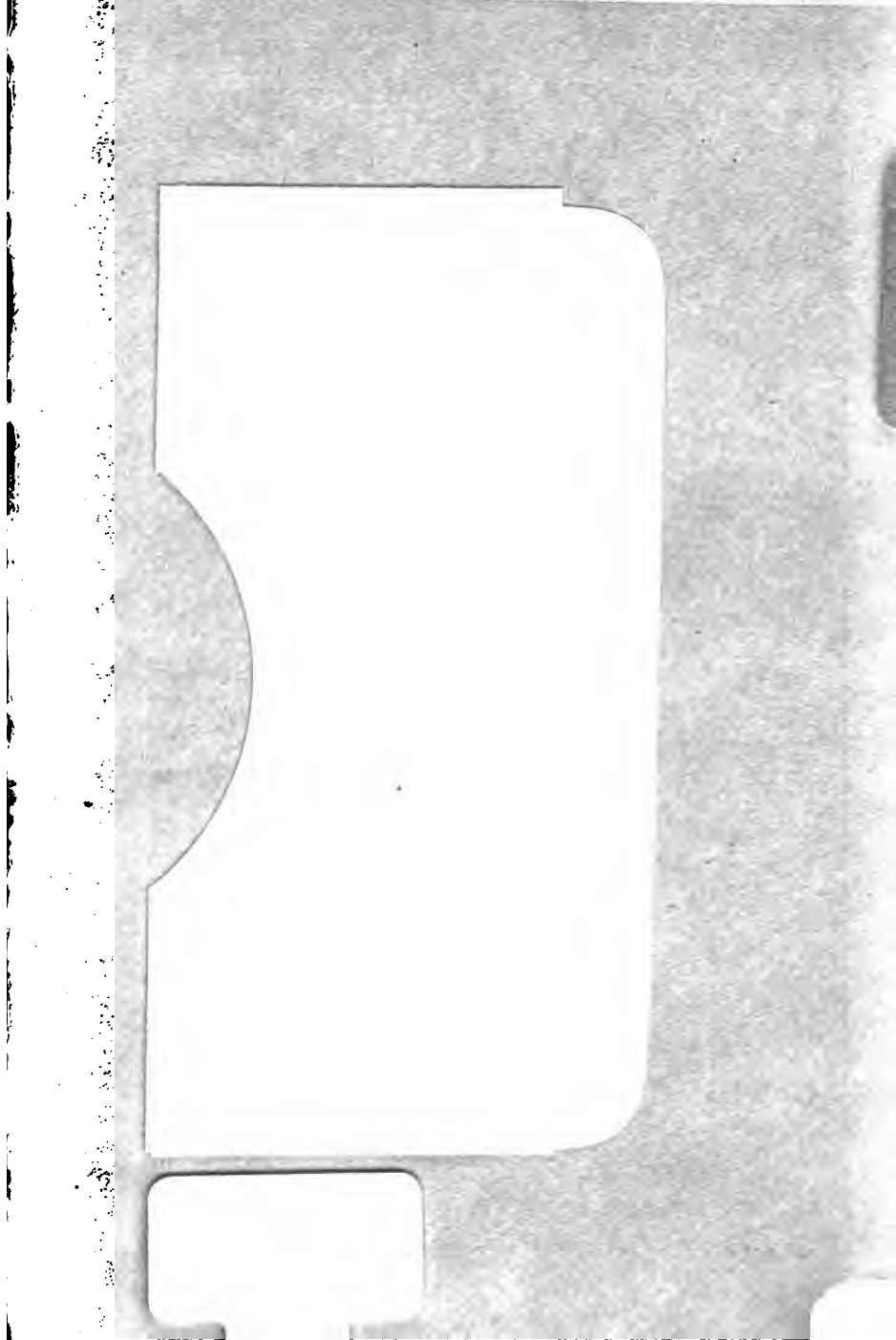
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